

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Reissue

Application of: Bill L. Davis and Jesse S. Williamson

Entitled: COMBINED LITHOGRAPHIC/FLEXOGRAPHIC
PRINTING APPARATUS AND PROCESS

For: Reissue of U.S. Patent 5,630,363

Filed: May 20, 1999

Serial No.: 09/315,796

Examiner: Not Yet Assigned

Group Art Unit: 2854

SUPPLEMENTAL STATEMENT OF PRIOR ART AND OTHER INFORMATION

APPENDIX 5

V. File History Pertinent to Series Commencing with
United States Serial No. 08/435,798 filed May 4, 1995

Index No. Description

65
File History of European Patent Application No. EP 0741 025 A3 entitled:
Retractable Inking /Coating Apparatus having Ferris Movement between Printing
Units, Applicant: Howard W. DeMoore; Inventors: Howard W. DeMoore, Ronald
M. Rendleman and John W. Bird; Filed: May 5, 1993; Date of Publication A2:
November 6, 1996

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AUG 05 1999

TECHNOLOGY CENTER 2800

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AUG 03 1999

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EPA/EPO/OEB
D-80298 München
089/2399-0
TX 523 656 epmu d
FAX 089/2399-4465

**Europäisches
Patentamt**

European
Patent Office

Office européen des brevets

Generaldirektion 2

Directorate General 2

Direction Générale 2

Rechnung / Invoice / Facture

BIRD & BIRD
ATTN: MS. CECILIA CHEUNG
90 FETTER LANE
LONDON EC4A 1JP
GREAT BRITAIN

Kundennummer 01500251
Customer number 01500251
Numéro du client 01500251

um/Date

Zeichen/Ref./Réf. LIBRY. 0666	Anmeldung Nr./Application No./Demande n°./Patent Nr./Patent No./Brevet n°. 96303136.4 2304 0741025
Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire DeMoore, Howard W.	

Übersendung von/Transmission of/Envoi de

Antraq yom/Request dated/Requête du 14/06/99

- Kopien bei Akteneinsicht nach Regel 94(3) EPÜ
Copies in the case of inspection of files pursuant to Rule 94(3) EPC
Copies en cas d'inspection publique selon la règle 94(3) CBE

Beglaubigung
Certification
Certification

_____ Prioritätsbeleg(e)/priority document(s)/document(s) de priorité R. 94(4)
 _____ Ausfertigung(en) der Patenturkunde nach Regel 54(2) EPÜ
Duplicate of the patent certificate pursuant to Rule 54(2) EPC
Duplicata du certificat de brevet, selon la Régule 54(2) CBE

_____ Auszug aus dem Register nach Regel 92(3) EPÜ
Extract from the register pursuant to Rule 92(3) EPC
Extrait du registre selon la Régule 92(3) CBE

_____ Auskunft aus den Akten nach Regel 95 EPÜ
Communication of information contained in the files pursuant to Rule 95 EPC
Communication d'informations contenues dans la dossier selon la Régule 95 CBE

_____ Akteinsicht nach Regel 94(2) EPÜ
Inspection of files pursuant to Rule 94(2) EPC
Inspection publique selon la Régule 94(2) CBE

Rechnung Nr./Invoice No./Facture N° 20189454

Bitte bei Zahlung unbedingt angeben
Indicate number without fail when paying
Ce n° doit absolument être indiqué lors du paiement

EUR Gegenwert
Equivalent **GBP**
Contre-valeur

Verwaltungsgebühr/Administration fee/Taxe d'administration

20.00 13.50

145 Blätter) 87.00 58.00

87.00

0,00 _____ 0,00

107.00

0.00 ————— 0.00

71 50

Der obengenannte Betrag wird abgebucht vom laufenden Konto Nr.
The above sum will be debited from deposit account No.
Le montant susmentionné sera débité du compte courant N° _____

X Der obengenannte Betrag ist nach den auf der Anlage angegebenen Zahlungsmöglichkeiten zu entrichten (f. 2566.1 + 2).
The above sum is payable as detailed on the annex (f. 2566.1 + 2).
Le montant indiqué ci-dessus doit être acquitté suivant les modalités figurant sur l'annexe (f. 2566.1 + 2).

GARRY A G (TEL: 2375)



Zahlungsmöglichkeiten

Nach Art. 5 der Gebührenordnung können die Gebühren wie folgt entrichtet werden:

- a) durch Einzahlung oder Überweisung auf ein Bankkonto des Amtes,
- b) durch Einzahlung oder Überweisung auf ein Postscheckkonto des Amtes,
- c) durch Übergabe oder Übersendung von Schecks, die an die Order des Amtes lauten,
- d) durch Abbuchung von einem laufenden Konto beim Amt.

Die Zahlungswährung richtet sich nach der Währung des Staats, in dem das Konto geführt wird.

Der Betrag ist "ohne Kosten für den Empfänger" zu überweisen.

Das Verzeichnis der für die Europäische Patentorganisation eröffneten Bank- und Postscheckkonten, sowie der entsprechenden Zahlungswährungen ist auf Form 2566.2 abgedruckt.

Methods of payment

Under Art. 5 of the rules relating to Fees the fees may be paid as follows:

- a) by payment or transfer to a bank account held by the Office,
- b) by payment or transfer to a giro account held by the Office,
- c) by delivery or remittance of cheques which are made payable to the Office,
- d) by debiting a deposit account held with the Office.

The currency for payment is determined by the currency of the State in which the account is held.

The fee is to be transferred "at no costs to the payee".

The list of bank and giro accounts opened in the name of the European Patent Organisation and corresponding currencies for payment is reproduced on Form 2566.2.

Modalités de paiement

Aux termes de l'article 5 du Règlement relatif aux taxes, les taxes peuvent être acquittées comme suit:

- a) par versement ou virement à un compte bancaire de l'Office,
- b) par versement ou virement à un compte chèques postal de l'Office,
- c) par remise ou envoi de chèques établis à l'ordre de l'Office,
- d) par prélèvement sur un compte courant ouvert auprès de l'Office.

Le paiement doit être effectué dans la monnaie de l'Etat où le compte est ouvert.

Le virement doit se faire "sans frais pour le destinataire".

La liste des comptes bancaires et de chèques postaux ouverts au nom de l'Organisation européenne des brevets et des monnaies de paiement correspondantes est reprise sur le formulaire Form 2566.2.

Verzeichnis der für die
Europäische Patentorganisation
eröffneten Bank- und
Postcheckkonten sowie der
entsprechenden
Zahlungswährungen

List of bank and giro accounts
opened in the name of the
European Patent Organisation
and corresponding currencies
for payment

Liste des comptes bancaires et
de chèques postaux ouverts au
nom de l'Organisation
européenne des brevets et
des monnaies de paiement
correspondantes

	Bankkonten Bank accounts Comptes bancaires	Postcheckkonten Giro accounts Comptes de chèques postaux	Zahlungswährung Currency for payment Monnaies de paiement
AT	N° 102-133-851/00 (BLZ 12000) Bank Austria AG Am Hof 2 A-1010 Wien	N° 7451 030 Österreichische Postsparkasse Georg-Coch-Platz 2 A-1018 Wien	Oester Schilling (ATS/EUR)
BE	N° 310-0448878-78 Banque Bruxelles Lambert BP 948 B-1000 Bruxelles	N° 080-1154426-28 Banque de la Poste B-1100 Bruxelles	Franc belge (BEF/EUR)
CH	N° 322 005 01 B UBS CH-8021 Zurich	N° 30-30785-1 Zahlungsverkehr PTT Verarbeitungszentrum CH-4040 Basel	Franc suisse (CHF)
CY	N° 0155-06-000-650 Bank of Cyprus 21, Evagoras Av. P. O. Box 1472 CY - 1599 Nicosia		Cyprus Pound (CYP)
DE	N° 3 338 800 00 (BLZ 700 800 00) Dresdner Bank Promenadeplatz 7 D-80273 München	N° 300-800 (BLZ 700 100 80) Postbank München D-80318 München	Deutsche Mark (DEM/EUR)
DK	N° 2015103758 Den Danske Bank Holmens Kanal Dept. Holmens Kanal 2 DK-1080 Kopenhagen K.	N° 086-5985 GIROBANK A/S Girostrøget 1 DK-0800 Høje Taastrup	Danske kroner (DKK)
ES	N° 0104/0328/95/0303480024 Banco Exterior de España Carrera de San Jerónimo 36 E-28014 Madrid	N° 00-18716786 Caja Postal Cuentas Extranjeras Pº de Recalada, 5 E-28070 Madrid	Peseta española (ESP/EUR)
FI	N° 200118-182076 Merita Bank Senateinitori FIN-00020 Merita	N° 800013-90405 Leonia Fabieninkatu 23 FIN-00007 Helsinki	Suomen Markka (FIM/EUR)
FR	N° 200 20463, Code banque 30 004, Code guichet 00 567, Cie Rib 28 Banque Nationale de Paris Agence France-Etranger 2 Place de l'Opéra F-75002 Paris		Franc français (FRF/EUR)
GB	N° 60 271 489 (sortirng-code 20-00-00) Barclays Bank PLC 54 Lombard Street P. O. Box 544 GB-London EC3V 8EX		Pound Sterling (GBP)
GR	N° 112002002007048 Credit Bank AE Athens Town Branch 2, Mousourou Avenue GR-115 27 Athens		Greek Drachma (GRD)
IE	N° 30982201 (Bank Code 90-14-90) Bank of Ireland Lower Baggott Street Branch P. O. Box 3131 IRL-Dublin 2		Irish pound (IEP/EUR)
IT	N° 936832 01 94, ABI 02002 / CAB 03200 Banca Commerciale Italiana Via del Plebiscito 112 I-00186 Roma	N° 10568277 Poste Italiane C.U.S. Piazza Vesuvio 6 I-20144 Milano	Lira italiana (ITL/EUR)
LU	N° 7-108/9134/200 Banque Internationale à Luxembourg 69, route d'Ech L-2853 Luxembourg	N° 26421-37 Administration des P & T Chèques postaux BP 2500 L-1090 Luxembourg	Franc belge (BEF/EUR)
MC	N° 254 22754, Code Banque 30 004, Code Guichet 09 179, Cie Rib 91 Banque Nationale de Paris Succursale de Monte-Carlo Galerie Charles III Av. Princes des Spélugues Boîte Postale 129 MC-98007 Monaco Cedex		Franc français (FRF/EUR)
NL	N° 51 36 38 547 ABN-AMRO Bank NV Kneuterdijk 1, Postbus 185 NL-2504 AP Den Haag	N° 4012627 Postbank NV NL-6800 MA Arnhem	Nederlandse Gulden (NLG/EUR)
PT	N° 0015/020 0808301145 / 05 Braco Pinto et Soito Meyer Av. Fontes Pereira de Melo 7 P-1000 Lisboa		Escudo português (PTE/EUR)
SE	N° 122 587 108 Bankgiro N° 5843-6155 Svenska Handelsbanken S-10670 Stockholm	N° 7 41 53-8 Postgirot S-10506 Stockholm	Svenska kronor (SEK)

Vollmacht / Authorisation / Pouvoir: ist beigelegt / is enclosed / ci-joint			20		
ist registriert unter Nummer / has been registered under No. / a été enregistré sous le n°			GENA	21	Nummer Number Número
ERFINDER / INVENTOR / INVENTEUR:			INVT 20 #	#	22
Anmelder ist (sind) alleinige(r) Erfinder / The applicant(s) is (are) the sole inventor(s) / Le(s) demandeur(s) est (sont) le (les) seul(s) inventeur(s)					
Erfindernennung auf gesondertem Schriftstück / Designation of inventor attached / Voir la désignation de l'inventeur ci-jointe					
BEZEICHNUNG DER ERFINDUNG / TITLE OF INVENTION / TITRE DE L'INVENTION:					
TIDE TIEN TIFR					
PRIORITÄTSEKLARUNG / DECLARATION OF PRIORITY / DECLARATION DE PRIORITE			PRIOR	24	RETRACTABLE INKING/COATING APPARATUS HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS
01	#	#		25	Staat / State / Etat
02	#	#			Anmeldetag / Filing date / Date de dépôt
03	#	#			Altenzeichen / Application No / N° de la demande
04	#	#		1	US 4 May 1995 08/435,798
Weitere Prioritätserklärungen auf Zusatzblatt / Additional declaration(s) of priority on additional sheet / Autres(s) déclaration(s) de priorité sur feuille additionnelle					
MIKROORGANISMEN			MICRO-ORGANISMS		
Die Erfindung betrifft einen Mikroorganismus (mehrere Mikroorganismen) oder seine (ihre) Verwendung, der (die) auf Grund des Budapestener Vertrages oder eines bilateralen Abkommens zwischen der Hinterlegungsstelle und dem EPA nach Regel 28(1) a) bei einer anerkannten Hinterlegungsstelle hinterlegt worden ist (sind), um die Bedingungen für die Offenbarung der Erfindung gemäß Artikel 83 in Verbindung mit Regel 28 zu erfüllen			The invention relates to and/or uses (a) micro-organism(s) deposited for the purposes of disclosure pursuant to Article 83 in conjunction with Rule 28 with a depositary institution recognised within the meaning of Rule 28(1) a) under either the Budapest Treaty or a bilateral agreement between the institution and the EPO		
MICO 1 # #					
Die Angaben nach Regel 28(1) c) sind in den technischen Anmeldungsunterlagen enthalten auf / The particulars referred to in Rule 28(1) (c) are given in the technical documents in the application on / Les indications visées à la règle 28(1) c) figurent dans les pièces techniques de la demande à la /aux					
werden später mitgeteilt / will be submitted at a later date / seront communiquées ultérieurement					
Die Empfangsbescheinigung(en) der Hinterlegungsstelle ist (sind) beigelegt / The receipt(s) of deposit issued by the depositary institution is (are) enclosed / Le(s) récépissé(s) de dépôt délivré(s) par l'autorité de dépôt est (sont) ci-joint(s)					
wird (werden) nachgereicht / will be filed at a later date / sera (seront) produit(s) ultérieurement					
27	Seite(n) / page(s)		Zeile(n) / line(s) / ligne(s)		
28					
29					
30					

**NUCLEOTID-UND AMINOSAURESEQUENZEN / NUCLEOTIDE
AND AMINO ACID SEQUENCES / SEQUENCES DE
NUCLEOTIDES ET D'ACIDES AMINES**

SEQ1 (1) 31

Die Beschreibung enthält ein Sequenzprotokoll nach Regel 27a(1) / The description contains a sequence listing in accordance with Rule 27a(1) / La description contient une liste de séquences selon la règle 27bis(1)

Der vorgeschriebene maschinenlesbare Datenträger ist beigefügt / The prescribed machine readable data carrier is enclosed / Le support de données prescrit déchiffrable par machine est annexé

Es wird hiermit erklärt, daß die auf dem Datenträger gespeicherte Information mit dem schriftlichen Sequenzprotokoll übereinstimmt (Regel 27a(2)) / It is hereby stated that the information recorded on the data carrier is identical to the written sequence listing (Rule 27a(2)) / Il est déclaré par la présente que l'information figurant sur le support de données est identique à celle qui contient la liste de séquences écrite (règle 27bis (2))

**Verschiedene Anmelder für verschiedene Vertragsstaaten /
Different applicants for different Contracting States /
Differents demandeurs pour différents Etats contractants**

APPR 02 #

32

Name(n) des (der) Anmelder(s) und benannte Vertragsstaaten /
Name(s) of applicant(s) and designated Contracting States /
Nom(s) du (des) demandeur(s) et des Etats contractants désignés

**BENENNUNG VON VERTRAGSSTAATEN
DESIGNATION OF CONTRACTING STATES
DESIGNATION D'ETATS CONTRACTANTS**

DEST

33

Osterreich / Austria / Autriche

AT

Belgien / Belgium / Belgique

BE

Schweiz und Liechtenstein / Switzerland and
Liechtenstein / Suisse et Liechtenstein

CH / LI

Deutschland / Germany / Allemagne

DE

Dänemark / Denmark / Danemark

DK

Spanien / Spain / Espagne

ES

Frankreich / France / France

FR

Vereinigtes Königreich / United Kingdom / Royaume-Uni

GB

Griechenland / Greece / Grece

GR

Irland / Ireland / Irlande

IE

Italien / Italy / Italie

IT

Luxemburg / Luxembourg / Luxembourg

LU

Monaco / Monaco / Monaco

MC

Niederlande / Netherlands / Pays-Bas

NL

Portugal / Portugal / Portugal

PT

Schweden / Sweden / Suede

SE

(Platz für Vertragsstaaten, für die das EPU nach
Druckung dieses Formblatts in Kraft tritt)'Space for Contracting States for which the EPC
enters into force after this form has been printed'

**VORSORGLICHE BENENNUNG
SAMTLICHER VERTRAGSSTAATEN**
Die in Feld 33 angegebenen Staaten sind jene, für die die Zahlung der Benennungsgebühren vorgenommen wurde oder derzeit beabsichtigt ist. Vorsorglich werden jedoch sämtliche Staaten benannt, die zum Zeitpunkt der Einreichung dieser Anmeldung Vertragsstaaten des EPU sind (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). Es wird erteilt, die Benennung der hier zusätzlich benannten Vertragsstaaten als vom Anmelder zurückgenommen zu betrachten, wenn für diese Staaten die Benennungsgebühren nicht bis zum Ablauf der in Regel 85a(2) vorgesehenen Nachfrist entrichtet werden. Es wird beantragt, von der Zustellung einer Mitteilung nach Regel 85a(1) und einer Mitteilung nach Regel 69(1) betreffend die hier zusätzlich benannten Vertragsstaaten abzusehen.

**PRECAUTIONARY DESIGNATION OF
ALL CONTRACTING STATES**
The States indicated in Section 33 are those for which it is at present intended to pay designation fees if these have not already been paid. As a precautionary measure, however, all those States which are Contracting States to the EPC at the time of filing this application are designated (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). It is hereby requested that the designation of any additional States thereby included be regarded as withdrawn by the applicant if the designation fees have not been paid by the time the period of grace allowed in Rule 85a(2) expires. It is requested that no communication under Rule 85a(1) nor any communication under Rule 69(1) concerning the additional Contracting States designated above be notified

33a

(Prévu pour des Etats contractants à l'égard desquels
la CBE entre en vigueur après l'impression du
présent formulaire)

**DESIGNATION A TOUTES FINS UTILES
DE TOUS LES ETATS CONTRACTANTS**
Les Etats indiqués à la rubrique 33 sont ceux pour lesquels le paiement des taxes de désignation a été effectué ou pour lesquels l'on se propose actuellement de payer les taxes de désignation. Toutefois, à toutes fins utiles, sont désignés tous les Etats qui sont des Etats contractants de la CBE à la date du dépôt de la demande (1.10.1995 AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE). Il est demandé, au cas où les taxes de désignation pour les Etats contractants désignés à titre complémentaire ne seraient pas acquittées dans le délai supplémentaire prévu à la règle 85bis(2), que la désignation desdits Etats soit considérée comme retirée par le demandeur. Prière de ne pas procéder pour lesdits Etats contractants désignés à titre complémentaire à la signification d'une notification établie conformément à la règle 85bis(1) ou à la règle 69(1).

**ERSTRECKUNG DES
EUROPAISCHEN PATENTS**

Diese Anmeldung gilt als Antrag, die europäische Patentanmeldung und das darauf erierte europäische Patent auf alle Nicht-Vertragsstaaten des EPU zu erstrecken, mit denen am Tag ihrer Einreichung „Erstreckungs-
abkommen“ bestehen.
(Derzeit Litauen, Lettland,
Slowenien)
Die Erstreckung wird jedoch nur
wirksam, wenn die vorgeschriebene
Erstreckungsgebühr entrichtet wird.

**EXTENSION OF THE
EUROPEAN PATENT**

This application is deemed to be a request to extend the European patent application and the European patent granted in respect of it to all non-Contracting States to the EPC with which "extension agreements" exist on the date on which the application is filed. (Present situation Lithuania, Latvia, Slovenia)
However, the extension only takes effect if the prescribed extension fee is paid.

**EXTENSION DES EFFETS
DU BREVET EUROPEEN**

La présente demande est réputée constituer une requête en extension des effets de la demande de brevet européen et du brevet européen délivré sur la base de cette demande à tous les Etats non parties à la CBE avec lesquels il existe un «accord d'extension» à la date du dépôt de la demande (Situation actuelle : Lituanie, Lettonie, Slovénie). Toutefois l'extension ne produit ses effets que s'il est acquitté la taxe d'extension prescrite.

EXPT

Der Anmelder beabsichtigt derzeit, die Erstreckungsgebühr für die nachfolgend angekreuzten Staaten zu entrichten: /
The applicant currently intends to pay the extension fee for the States marked below with a cross. /
Le demandeur se propose actuellement d'acquitter la taxe d'extension pour les Etats dont le nom est coché ci-après :

Litauen / Lithuania / Lituanie

LT

Lettland / Latvia / Lettonie

LV

Slowenien / Slovenia / Slovenie

SI

Platz für Signatur oder handschriftliche Angabe nach Drucklegung dieses Formblatts. Erstreckungsabkommen in Kraft treten/
Signature or handwritten entry to be made after printing of this form. Extension agreement enters into force at this time has been printed/
Signature ou la date d'entrée en vigueur de l'accord d'extension est entrée à l'équivalence de l'impression
du formulaire.

Die Anmeldung ist eine Teilanmeldung /
The application is a divisional application /
La présente demande constitue une demande divisionnaire

DFIL 9

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PANR

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Nummer der früheren Anmeldung
No. of earlier application
Numero de la demande initiale

Es handelt sich um eine Anmeldung nach Art. 61(1)(b) /
The application is an Art. 61(1)(b) application /
La présente demande constitue une demande selon l'article 61(1)b)

DFIL 9

#

EANR

#

36

Nummer der früheren Anmeldung
No. of earlier application
Numero de la demande initiale

Patentansprüche / Claims / Revendications

CLMS

22

Zahl der Patentansprüche
Number of claims
Nombre de revendications

AUCL (1)

Zahl der Patentansprüche
Number of claims
Nombre de revendications

AUCL (3)

Zahl der Patentansprüche
Number of claims
Nombre de revendications

AUCL (4)

Zahl der Patentansprüche
Number of claims
Nombre de revendications

**Zur Veröffentlichung mit der Zusammenfassung wird vorgeschlagen
Abbildung Nr. / With the abstract it is proposed to publish
figure No. / Il est proposé de publier avec l'abrége
la figure n°**

DRAW (2)

1

Nummer / Number / Numero

**Zusätzliche Abschrift(en) der im europäischen Recherchenbericht
angeführten Schriftstücke wird (werden) beantragt / Additional copy(ies)
of the documents cited in the European search report is (are) requested /
Prise de fournir une (des) copie(s) supplémentaire(s) des
documents cités dans le rapport de recherche européenne**

ASOC

40

1

Anzahl der zusätzlichen Satze von Abschriften
Number of additional sets of copies
Nombre de jeux supplémentaires de copies

Es wird die Rückerstattung der Recherchengebühr gemäß Art. 10 GebO beantragt / Refund of the search fee is requested pursuant to Article 10 of the Rules relating to Fees / Le remboursement de la taxe de recherche est demandé en vertu de l'article 10 du règlement relatif aux taxes

Eine Kopie des Recherchenberichts ist beigelegt / A copy of the search report is attached / Une copie du rapport de recherche est jointe

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AUTOMATISCHER ABBUCHUNGSAUFRAG (nur möglich für Inhaber von EPO-deposit-konten) /
AUTOMATIC DEBIT ORDER (for EPO deposit account holders only)
ORDRE DE PRELEVEMENT AUTOMATIQUE (uniquement possible pour les titulaires de comptes courants ouverts auprès de l'OEB)

Das Europäische Patentamt wird hiermit beauftragt, fällig werdende Gebühren und Auslagen nach Maßgabe der Vorschriften über das automatische Abbuchungsverfahren vom nebenstehenden laufenden Konto abzubuchen / The European Patent Office is hereby authorised, under the Arrangements for the automatic debiting procedure, to debit from the deposit account opposite any fees and costs falling due / Par la présente, il est demandé à l'Office européen des brevets de prélever du compte courant ci-contre les taxes et frais venant à échéance, conformément à la réglementation relative au prélevement automatique

DECA

Eventuelle Rückzahlungen auf das nebenstehende beim EPA geführte laufende Konto / Reimbursement, if any, to EPO deposit account opposite / Remboursements éventuels à effectuer sur le compte courant ci-contre ouvert auprès de l'OEB

DEPA

43

Nummer des laufenden Kontos / Deposit account number / Numéro du compte courant

Name des Kontoinhabers / Account holder's name / Nom du titulaire du compte

44

2805.0013

45

Nummer des laufenden Kontos / Deposit account number / Numéro du compte courant

Name des Kontoinhabers / Account holder's name / Nom du titulaire du compte

Die vorgeschriebene Liste über die diesem Antrag beigefügten Unterlagen ergibt sich aus der vorbereiteten Empfangsbescheinigung (Seite 6 dieses Antrages)

The prescribed list of documents enclosed with this request is shown on the prepared receipt (page 6 of this request)

Unterschrift(en) des (der) Anmelder(s) oder Vertreter(s) / Signature(s) of applicant(s) or representative(s) / Signature(s) du (des) demandeur(s) ou du (des) mandataire(s)

Ort / Place / Lieu London, GB

Datum / Date 3 May 1996

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Für Angestellte nach Artikel 133 (3) Satz 1 mit allgemeiner Vollmacht / For employees under Article 133 (3), 1st sentence, having a general authorisation / Pour les employés mentionnés à l'article 133, paragraphe 3, 1re phrase, munis d'un pouvoir général Nr. / No. / n° :


H A GURA
AUTHORISED REPRESENTATIVE

In this application, unless expressly stated otherwise, the cancellation, abandonment or amendment of any claim or any amendment in the description does not amount to abandonment of any subject matter in the application and upon any such cancellation, abandonment or amendment the right to file divisional applications in respect of any subject matter in the application as filed is maintained.

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HAG/FP5233994

RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS

In Sachen der obenbezeichneten europäischen Patentanmeldung nennt (nennen) der (die) Unterzeichnete(n)¹
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**"RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS"**

This invention relates to sheet-fed or web-fed, rotary offset or flexographic printing presses, and more particularly, to a new and improved inking/coating apparatus for the in-line application of printing inks or protective or decorative coatings to sheet or web substrates.

Conventional sheet-fed, rotary offset printing presses typically include one or more printing units through which individual sheets are fed and printed with wet ink. Since the inks used with rotary offset printing presses typically remain wet and tacky for some time after printing, special precautions must be taken to insure that the freshly printed sheets are not marked or smeared as the sheets are transferred from one printing unit to another, and while being conveyed to the sheet delivery stacker. The printed surface of the freshly printed sheet dries relatively slowly and can be smeared during subsequent transfer between printing units. In order to reduce smearing and offsetting, spray powder is applied on the printed sheet.

In some printing applications, offset and smearing are prevented by applying a protective and/or decorative coating over all or a portion of the freshly printed sheets. Various arrangements have been proposed for applying the protective or decorative coating as an in-line operation by using the last printing unit of the press as the coating application unit. However, when such in-

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line coating is performed, the last printing unit cannot be used to apply ink to the sheets, and can only be used for the coating operation. Thus, while coating with these types of in-line coating apparatus, the press loses the 5 capability of printing its full range of colors since the last printing unit is converted to a coating unit.

It will be appreciated that the time required to reconfigure a press for coating or non-coating is non-productive and costly. Accordingly, there is a need for an 10 in-line coating apparatus that minimizes the time to clean-up from one printing run and set-up and run the next job. Where consecutive jobs require the same type of coating, particularly blanket coating, it may not be necessary to clean-up the coater between jobs. However, the coating 15 material cannot be allowed to dry on the rollers. Therefore, especially when switching from blanket to spot coating or vice versa, or if there is a delay between jobs, it is necessary to wash-up the coater after each job is completed.

20 In addition, coater wash-up is necessary when switching between different coating compositions, such as aqueous and ultra violet (UV) curable coatings. Such coating materials are not interchangeable, and consequently, the coater must be washed between applications of 25 different coating media.

The foregoing limitations are overcome, according to the present invention, by a retractable, in-line inking/coating apparatus which is mounted on a printing

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unit for pivotal, Ferris wheel movement between an operative inking/coating position and a retracted, overhead idle position. The inking/coating apparatus includes an applicator head which, is positioned in alignment with either the plate cylinder or the blanket cylinder by a carriage assembly which includes a cantilevered support arm. The support arm is pivotally coupled between the inking/coating head and the printing unit tower. This cantilevered, pivotal mounting arrangement allows the inking/coating unit to be used between two printing units, as well as on the last printing unit of the press.

In the preferred embodiment, the applicator head includes vertically spaced pairs of cradle members with one cradle pair being adapted for supporting a metal or ceramic coating roller in alignment with a blanket cylinder, and the other cradle pair supporting a resilient anilox coating roller in alignment with the plate cylinder, respectively, when the carriage assembly is in the operative position. Because of the cantilevered, pivotal support provided by the support arm, the applicator head can be lifted and lowered through an arc, similar to Ferris wheel movement, in the limited space between adjacent printing units. When fully retracted, the applicator head and carriage assembly are lifted to an elevated, retracted overhead position, preferably an overhead position overlying the printing unit tower, thus providing complete access to the interstation space and the printing unit cylinders without causing the printing unit to lose its printing capability. The

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inking/coating applicator roller of the applicator head can be inspected, cleaned or replaced and the doctor blade assembly can be washed-up automatically while the inking/coating apparatus is in the retracted position.

5 When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous ink or aqueous coating, the water component of the aqueous ink or coating on the freshly printed sheet is evaporated by a high velocity, hot air interstation dryer and a high
10 volume heat and moisture extractor assembly so that the freshly printed ink or coating is completely dry before the sheet is printed on the next printing unit. This quick drying flexographic printing/coating arrangement permits a base coat of ink, for example opaque white or metallic ink
15 (gold, silver or other metallics) to be applied in the first printing unit, and then overprinted by a lithographic process on the next printing unit.

Exemplary embodiments of the present invention are illustrated in the drawing figures wherein:

20 FIGURE 1 is a schematic side elevational view of a sheet-fed, rotary offset printing press having inking/coating apparatus embodying the present invention;

FIGURE 2 is a perspective view of the printing press of FIGURE 1 in which a dual head inking/coating apparatus is in the operative coating position and a single head coater is in a retracted, overhead position;

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FIGURE 3 is an enlarged simplified perspective view showing one side of the single head inking/coating apparatus of FIGURE 1 in the operative position;

FIGURE 4 is a simplified side elevational view
5 showing the dual head inking/coating apparatus in the operative coating position for spot or overall coating from the blanket position;

FIGURE 5 is a simplified side elevational view
showing the single head inking/coating apparatus in the
10 operative coating position for spot or overall coating from
the plate position; and,

FIGURE 6 is a simplified side elevational view of
the dual head inking/coating apparatus of FIGURE 4,
partially broken away, which illustrates the hydraulic
15 drive assembly and doctor blade assembly.

As used herein, the term "processed" refers to various printing methods which may be applied to either side of a substrate, including the application of UV-curable and aqueous inks and/or coatings. The term
20 "substrate" refers to sheet or web material. Also, as used herein, the term "waterless printing plate" refers to a printing plate having non-image surface areas which are hydrophobic and also having image surface areas which are hydrophilic, wherein the non-image surface areas are
25 characterized by a surface tension value which is less than the surface tension of aqueous ink, and the image surface areas are characterized by a surface tension value which is greater than the surface tension of aqueous ink. "Flexo-

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"graphic" refers to flexible printing plates having a relief surface which is wettable by aqueous ink or aqueous coating material.

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line inking/coating apparatus 10, for applying inks or protective and/or decorative coatings to sheets or webs printed in a sheet-fed or web-fed, rotary offset or flexographic printing press, herein generally designated 12. In this instance, as shown in FIGURE 1, the inking/coating apparatus 10 is installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation Heidelberg Speedmaster 102V. The press 12 includes a press frame 14 coupled at one end, herein the right end, to a sheet feeder 16 from which sheets, herein designated S, are individually and serially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the freshly printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical rotary offset printing units 22, 24, 26 and 28 which can print different color inks onto the sheets as they are transferred through the press 12. The printing units are housed within printing towers T1, T2, T3 and T4 formed by side frame members 14, 15.

As illustrated, the printing units 22, 24, 26 and 28 are substantially identical and of conventional design.

TOP SHEET FEEDER

The first printing unit 22 includes an in-feed transfer cylinder 30, a plate cylinder 32, a blanker cylinder 34 and an impression cylinder 36, all supported for rotation in parallel alignment between the press side frames 14, 15.

5 Each of the first three printing units 22, 24 and 26 have an interunit transfer cylinder 38 disposed to transfer the freshly printed sheets from the adjacent impression cylinder to the next printing unit via an interstation transfer cylinder 40. The last printing unit 28 is shown equipped with a delivery cylinder 42 which guides each freshly printed sheet 18 as it is transferred from the last impression cylinder 36 to a delivery conveyor system, generally designated 44, to the sheet delivery stacker 20.

The delivery conveyor system 44 as shown in FIGURE 2 is of conventional design and includes a pair of continuous delivery gripper chains 46, only one of which is shown carrying at regular spaced locations along the chains, laterally disposed gripper bars having gripper fingers for gripping the leading edge of a freshly printed sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing unit 28. As the leading edge is gripped by the grippers, the delivery chains 46 pull the freshly printed sheet away from the impression cylinder 36 and deliver the freshly printed sheet to the sheet delivery stacker 20.

Prior to reaching the delivery sheet stacker, the freshly printed and/or coated sheets pass under a delivery dryer 48 which includes a combination of infra-red

thermal radiation, high velocity hot air flow and heat and moisture extraction for drying the ink and/or the protective/decorative coating on the freshly printed sheets.

In the exemplary embodiment shown in FIGURE 1,
5 the first printing unit 22 is equipped with a flexographic printing plate, and does not require an inking roller train or a dampening system. If an ink roller train is mounted on the first printing unit, the form rollers are retracted and locked off when the printing unit goes on impression.
10 Flexographic aqueous ink is supplied by the inking/coating unit 110. The remaining printing units 24, 26 and 28 are equipped for lithographic printing and include an inking apparatus 50 having an inking roller train 52 arranged to transfer ink from an ink fountain 54 to the plate cylinder 32. This is accomplished with the aid of a fountain roller 56 and a doctor roller. The fountain roller 56 projects into the ink fountain 54, whereupon its surface is wetted with printing ink Q. The printing ink Q is transferred intermittently to the inking roller train 52 by the doctor
15 roller. The inking roller train 52 supplies printing ink Q to the image areas of a printing plate P mounted on the plate cylinder 32.

The printing ink Q is transferred from the printing plate P to an ink receptive blanket B which is
25 mounted on the blanket cylinder 34. The inked image carried on the blanket B is transferred to a sheet S as the sheet is transferred through the nip between the impression cylinder 36 and the blanket B.

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The inking roller arrangement 52 illustrated in FIGURE 1 is exemplary for use in combination with lithographic ink printing plates. It will be understood that dampening rollers (not illustrated) will be in direct engagement with the lithographic plate P, but are not used in combination with the flexographic plate of printing unit 22.

Referring now to FIGURE 4, FIGURE 5 and FIGURE 6, the in-line inking/coating apparatus 10 includes a carriage assembly 58 which supports an applicator head 60. The applicator head 60 includes a hydraulic motor 62, a lower gear train 64, an upper gear train 65, an applicator roller 66 and a doctor blade assembly 68. The external peripheral surface of the applicator roller 66 is inserted into wetting contact with liquid coating material or ink contained in a reservoir 70. The reservoir 70 is continuously supplied with ink or coating which is circulated through the reservoir 70 from an off-press source by a pump (not illustrated). The hydraulic motor 62 drives the applicator roller 66 synchronously with the plate cylinder 32 and the blanket cylinder 34 in response to an RPM control signal from the press drive (not illustrated) and a feedback signal developed by a tachometer 72. While a hydraulic drive motor is preferred, an electric drive motor can be used.

The applicator roller 66 is preferably a fluid metering anilox roller which transfers measured amounts of printing ink or coating material onto the printing plate or

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blanket. The surface of an anilox roller is engraved with an array of closely spaced, shallow depressions referred as "cells". Ink or coating material from the reservoir 70 flows into the cells as the anilox roller turns through the 5 reservoir. The transfer surface of the anilox roller is scraped with a doctor blade 73 to remove excess ink or coating. The ink or coating remaining on the anilox roller is the measured amounts contained within the cells.

The applicator roller 66 is cylindrical and may 10 be constructed in various diameters and lengths, containing cells of various sizes and shapes. The volumetric capacity of an anilox roller is established during manufacturing and is dependent upon the selection of cell size, shape and number of cells per unit area. Depending upon the intended 15 application, the cell pattern may be fine (many small cells per unit area) or coarse (fewer larger cells per unit area).

By applying the ink or coating material through the inking/coating applicator head 60, more ink or coating 20 material can be delivered to the sheet S as compared with the inking roller train of a lithographic printing unit. Moreover, color intensity is stronger and more brilliant because the flexographic ink is applied at a much larger film thickness than can be applied by the lithographic 25 process and is not diluted by dampening solution.

The inking/coating applicator head 60 includes side frame members 74, 76 that support the applicator roller 66, gear train 64, gear train 65, doctor blade

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assembly 68 and the drive motor 62. The applicator roller 66 is supported at opposite ends on a lower cradle formed by a pair of end plates 78, 80 which hold the applicator roller 66 in parallel alignment with the blanket cylinder 34 (FIGURE 5). The side frames 74, 76 are also provided with an upper cradle formed by a pair of side plates 82, 84 which are vertically spaced with respect to the lower side plates 78, 80. Each cradle has a pair of sockets 79, 81 and 83, 85, respectively, for holding the applicator roller 66 for spot coating or inking engagement against the plate P of the plate cylinder 32 (FIGURE 4) or the blanket B of the blanket cylinder 34.

Preferably, the applicator roller 66 for the upper cradle (plate) position is an anilox roller having a resilient transfer surface. In the dual cradle arrangement, the press operator can quickly change over from blanket inking/coating and plate inking/coating with minimum press down time, since it is only necessary to remove and reposition or replace the applicator roller 66, and wash-up the doctor blade assembly if changing from ink to coating or vice versa. The capability to selectively operate in either the flexographic mode or the lithographic mode and to print or coat from either the plate or blanket position is referred to herein as the "LITHOFLEX" process.

Referring again to FIGURE 2 and FIGURE 3, the applicator head 60 is supported by the carriage assembly 58 in a cantilevered, pivotal arrangement which allows the dual cradle inking/coating apparatus 10 and a single cradle

inking/coating apparatus 110 to be used between any two adjacent printing units, as well as used on the first and last printing units of the press. This is made possible by a pair of cantilevered support arms 88, 90 that are 5 pivotally coupled to the side plates 74, 76, respectively, on a pivot shaft 77. Each support arm has a hub portion 88A, 90A, respectively, and an elongated shank portion 88B, 90B, respectively.

The cantilevered support arms are pivotally 10 mounted on the printing tower by pivot blocks 92, 94, respectively. The hub portions 88A, 90A are journalled for rotation on pivot shafts 96, 98, respectively. The pivot blocks 92, 94 are securely fastened to the tower 14D, so that the carriage assembly 86 is pivotally suspended from 15 the pivot shafts 96, 98 in a cantilevered Ferris support arrangement. The shank portions 88B, 90B are pivotally coupled to the pivot shaft 77, so that the carriage assembly 58 and the applicator head 60 are capable of independent rotation with respect to each other and with 20 respect to the pivot shaft 77. By this arrangement, the applicator head 60 is pivotally suspended from the pivot shaft 77, and remains in an upright orientation as the support arms rotate from the operative position to the fully retracted position, and vice versa.

25 Thus, the cradles 78, 80 and 82, 84 position the applicator roller 66 in vertical and horizontal alignment with the plate cylinder or blanket cylinder when the applicator head is extended to the operative position, for

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example as shown in FIGURE 4 and FIGURE 5. Moreover, because of the transverse relationship between the hub portion and shank portion of the support arms, the applicator head 60 and carriage assembly 58 are capable of 5 rotating through a Ferris arc without touching the adjacent printing tower. This makes it possible to install the inking/coating apparatus 10 on any intermediate printing unit tower (T2, T3), and as well as on the first printing unit tower T1 and the last printing unit tower T4. Additionally, when the inking/coating unit 10 is in the operative position, the lateral projection of the applicator head 60 10 into the interstation space between printing units is minimized. This assures virtually unrestricted operator access to the interstation space between adjacent printing units when the applicator head is engaged in the operative position, and completely unrestricted access when the 15 carriage assembly 58 is retracted.

Rotation of the carriage assembly 58 is counter-clockwise from the retracted, idle position (shown in phantom in FIGURE 1) to the operative position (FIGURE 4 and FIGURE 5). The carriage assembly 58 can be adapted for clockwise rotation from the retracted position to the operative position for engagement of the applicator roller to either the plate or the blanket on the dampener side of the tower, assuming that access to the plate and blanket is not restricted by dampener rollers or the like.

Rotational movement of the support arms 88, 90 is assisted by counterweights 100, 102 which are secured to

the support arms, respectively, for concurrent rotation with respect to the pivot blocks 92, 94. With the passive assistance of the counterweights, the press operator can easily move the inking/coating assembly 10 from the engaged 5 operative position as shown in FIGURE 4 to the fully retracted, idle position as shown in phantom in FIGURE 1. Preferably, rotation of the carriage assembly 58 is assisted by a torsion spring, electric motor or hydraulic motor.

- 10 The inking/coating apparatus 10 is releasably locked into the operative position as shown in FIGURE 4 by releasable latch couplings 103, 105 that secure the support arms 88, 90 to the press side frames 14, 15, respectively, of the printing unit tower T4 in the operative position.
- 15 Coating engagement of the applicator roller 66 against the blanket cylinder 34 is produced by power actuators, preferably pneumatic cylinders 104, 106 which have extendable/retractable power transfer arms 104A, 106A, respectively. The pneumatic cylinder 104 is pivotally 20 coupled to the support arm 88 by a pivot linkage 108, and the second pneumatic cylinder 106 is pivotally coupled to the support arm 90 by a pivot linkage 109. In response to actuation of the pneumatic cylinders 104, 106, the power transfer arms are retracted. As the transfer arms retract, 25 the inking/coating head 60 is rotated counterclockwise on the pivot shaft 77, thus moving the applicator roller 66 into coating engagement with the blanket cylinder 34.

PRINTING UNIT TOWER T4

The pivot linkage 108 includes a bell crank 111 which is mounted for pivotal movement on a pin 113. The pin 113 is supported by a clevis plate 115 which is attached to the support arm 88. One end of the bell crank 5 is pivotally coupled to the actuator arm 104A, and a cam roller 117 is mounted for rotation on its opposite end.

The cam roller 117 is engagable against an adjustable stop 119 which is rigidly secured to the side plate 74. Counterclockwise shifting of the handle H moves 10 a cam follower 121 into a latch pocket 123 of a receiver block 125 as the cam roller 117 is moved into engagement with the adjustable stop 119 in the interlocked, operative position. Referring to FIGURE 4, FIGURE 5 and FIGURE 6, the receiver block 125 is secured to the delivery side of 15 the printing unit tower by machine screws.

When the plate P goes on impression, power is applied to the pneumatic actuator 104 and the power transfer arm 104A retracts, thus causing the bell crank 111 to rotate counterclockwise about the pin 113. The torque 20 applied by the pneumatic actuator 104 is transmitted to the applicator head 60 through the cam roller 117 and the adjustable stop 119. Counterclockwise movement of the applicator head 60 relative to the support shaft 77 carries the applicator roller 66 into engagement with the plate P.

25 The adjustable stop 119 has a threaded bolt 119A which is engagable with the cam roller 117. The striking point of engagement is preset so that the applicator roller 66 is properly positioned for engagement with the plate P

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or blanket B in the operative position when the applicator head 60 is interlocked with the press frame 14 and the printing unit goes on impression.

Referring to FIGURE 5, an inking/coating apparatus 110 having a single head is illustrated. The construction of this alternative embodiment is identical in all respects with the dual head arrangement, with the exception that only a single gear train and a single cradle for holding the applicator roller is provided. In both 10 embodiments, the inking/coating head 60 remains upright as it swings through an arc, comparable to the movement of a Ferris wheel. Because of the upright orientation of the inking/coating head 60 as it moves between the extended and retracted positions, the usual platform spacing between 15 printing unit towers provides adequate clearance to permit extension and retraction of the carriage assembly 58 without interference with operator access to the printing units. This is a significant advantage in that it permits the in-line inking/coating apparatus 10 to operate effectively 20 in the interstation space between any adjacent printing units, and without blocking or obstructing access to the cylinders of the printing units when the inking/coating apparatus is in the retracted position (as indicated in phantom in FIGURE 1).

Moreover, when the in-line inking/coating apparatus is in the fully retracted position, the applicator roller 66 is conveniently positioned on the dampener side of the printing unit for inspection, clean-up or

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replacement. Additionally, the doctor blade assembly is also conveniently positioned for inspection, removal, adjustment or clean-up. Also, the doctor blade reservoir and coating circulation lines can be cleaned while the 5 press is running as well as when the press has been stopped for change-over from one type of ink or coating material to another.

When the inking/coating apparatus is used for applying an aqueous ink or an aqueous coating material, the 10 water component on the freshly printed sheet S is evaporated by a high velocity, hot air interstation dryer and high volume heat and moisture extractor units 112 and 114, as shown in FIGURE 1, FIGURE 4 and FIGURE 5. The dryer/extractor units 112 and 114 are oriented to direct high 15 velocity heated air onto the freshly printed/coated sheets as they are transferred by the interunit and the intermediate transfer cylinders 36, 40. By this arrangement, the freshly printed aqueous ink or coating material is completely dry before the sheet is overprinted in the next 20 printing unit.

The high velocity, hot air dryer and high performance heat and moisture extractor units 112, 114 utilize high velocity air jets which scrub and break-up the moist air level which clings to the surface of each freshly 25 printed sheet. Within each dryer, high velocity air is heated to a high temperature as it flows across a resistance heating element within an air delivery baffle tube. High velocity jets of hot air are discharged through

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multiple airflow apertures through an exposure zone Z (FIGURE 4 and FIGURE 5) onto the freshly printed/coated sheet S as it is transferred by the transfer cylinder 36 and intermediate transfer cylinder 40, respectively. Each 5 dryer assembly includes a pair of air delivery dryer heads which are arranged in spaced, side-by-side relation as shown in FIGURE 4 and FIGURE 5.

The high velocity, hot moisture-laden air displaced from each freshly printed sheet is extracted from 10 the dryer exposure zone Z and completely exhausted from the printing unit by the high volume extractors. Each extractor head includes a manifold coupled to the dryer heads and draws the moisture, volatiles and high velocity hot air through a longitudinal gap between the dryer heads. 15 According to this arrangement, each printed sheet is dried before it is run through the next printing unit.

The water-based inks used in flexographic printing dry at a relatively moderate drying temperature provided by the interstation high velocity hot air dryers/extractors 112, 114. Consequently, print quality is 20 substantially improved since the aqueous ink is dried at each printing unit before it enters the next printing unit. Moreover, back-trapping on the blanket of the next printing unit is completely eliminated. This interstation drying 25 arrangement makes it possible to print aqueous inks such as metallic ink and opaque white ink at one printing unit, and then overprint at the next printing unit.

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This arrangement also permits the first printing unit to be used as a coater in which an aqueous coating is applied to low grade paper, for example recycled paper, to trap and seal in lint, dust, spray powder and other debris 5 and provide a smoother, durable surface that can be overprinted in the next printing unit. The first down coating seals the surface of the low grade, rough substrate and improves overprinted dot definition while preventing strike-through and show-through. A UV-curable protective 10 and/or decorative coating can be applied over the first down overprinted (aqueous) coating in the last printing unit.

Preferably, the applicator roller 66 is constructed of metal or ceramic when it is used for applying 15 a coating material to the blanket B on the cylinder 34. When the applicator roller 66 is applied to the plate, it is preferably constructed as an anilox roller having a resilient transfer surface for engaging a flexographic printing plate. Suitable resilient roller surface materials 20 also include Buna N synthetic rubber and EPDM (terpolymer elastomer).

It will be appreciated that the inking/coating apparatus 10 is capable of applying a wide range of ink types, including fluorescent (Day Glo), pearlescent, 25 metallics (gold, silver and other metallics), glitter, scratch and sniff (micro-encapsulated fragrance), scratch and reveal, luminous, pressure-sensitive adhesives and the like.

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- The press operator can eliminate the dampener roller assembly altogether, and the inking/coating apparatus 10 can selectively apply aqueous inks and coatings to a flexographic or waterless printing plate and the blanket.
- 5 Moreover, overprinting of the aqueous inks and coatings can be carried out in the next printing unit since the aqueous inks and coatings are completely dried by the high velocity, hot air interstation dryer and high volume heat and moisture extractor assembly.
- 10 The aqueous inks and coatings as used in the present invention contain colored pigments and/or soluble dyes, binders that fix the pigments onto the surface of the printed sheet, and waxes, defoamers and thickeners. Aqueous printing inks predominantly contain water as a
- 15 solvent, diluent and/or vehicle. The thickeners which are preferred include algonates, starch, cellulose and its derivatives, for example cellulose esters or cellulose ethers and the like. Coloring agents including organic as well as inorganic pigments may be derived from dyes which
- 20 are insoluble in water. Also, the printing ink may contain water and can be predominantly glycol or the like, with the pigment being bound by an appropriate resin. When metallic inks are printed, the cells of the anilox roller must be appropriately sized to prevent the metal particles from
- 25 getting stuck within the cells. The cell size is critical, and for metallic gold ink, the anilox roller should have a screen line count in the range of 175-300 lines per inch (69-118 lines per cm).

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The inking/coating apparatus 10 can also apply UV-curable inks and coatings. If UV-curable inks and coatings are utilized, ultra-violet dryers/extractors are installed adjacent the high velocity hot air dryer/extractor units 112, 114, respectively.

It will be appreciated that the inking/coating apparatus 10 described herein makes it possible to selectively operate a printing unit in either the flexographic printing mode or the lithographic printing mode, while also providing the capability to print or coat from either the plate or blanket position. The dual cradle support arrangement of the present invention makes it possible to quickly change over from inking/coating at the blanket cylinder position to inking/coating at the plate cylinder position with minimum press down-time, since it is only necessary to remove and reposition or replace the applicator roller 66 while the printing/inking apparatus is in the retracted position.

Moreover, the press operator may elect to spot or overall coat with aqueous ink/coating from the plate during one job, and then spot and/or overall coat from the blanket during the next job. Since the doctor blade assembly can be flushed and washed-up quickly and the applicator roller can be replaced quickly, it is possible to spot coat or overall coat from the plate position or the blanket position with aqueous inks or coatings during the first press run and then spot coat or overall coat with UV-curable inks or coatings from the plate position or from

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the blanket position during the next press run. The inking/coating apparatus 10 is completely out of the way in the retracted position; consequently, the doctor blade reservoir and supply lines can be flushed and washed-up by
5 automatic wash-up equipment while the printing unit is printing another job.

The positioning of the applicator head and roller assembly relative to the plate and blanket is repeatable to a predetermined, preset impression position. Consequently,
10 no printing unit adjustment or alteration is required, except for flushing the doctor blade assembly and cleaning or replacing the applicator roller to accommodate a different kind of ink or coating material. Although manual extension and retraction have been described in connection
15 with the exemplary embodiment, extension to the operative position and retraction to a non-operative idle position can be carried out automatically by hydraulic or electric motor servomechanisms.

The Ferris wheel support arrangement allows the
20 inking/coating apparatus to operate effectively in the interstation space between any adjacent printing units, as well as on the first or last printing units of the press, without blocking or obstructing the interstation space or restricting operator access to the cylinders of any of the
25 printing units.

Finally, because the inking/coating apparatus of the present invention is mounted on a printing unit tower and is extendable to the operative position without

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requiring adjustment or alteration of the printing unit cylinders, it can be used for applying printing ink or coating material to the blanket cylinder of a rotary offset web press, or to the blanket of a dedicated coating unit.

CLAIMS:

1. Inking/coating apparatus (10) for use in a printing press (12) of the type having a printing unit (22, 24, 26, 28) on which a plate cylinder (32), a blanket cylinder (34) and an impression cylinder (36) are mounted 5 for rotation, wherein the inking/coating apparatus is characterized by:

an applicator head (60) for applying ink or coating material to a plate (P) mounted on the plate cylinder or to a blanket (B) mounted on the blanket 10 cylinder, either separately or simultaneously when the inking/coating apparatus is in an operative position relative to the plate and blanket cylinders; and,

a carriage assembly (58) for moving the applicator head to the operative position in which the 15 applicator head is disposed laterally adjacent to the plate and blanket cylinders and for moving the applicator head from the operative position to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

20 2. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) is characterized by:

a support arm (88, 90) having a first end portion (88A) constructed for pivotal attachment to the

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printing unit and having a second end portion (88B) pivotally coupled to the applicator head (60), the applicator head being movable on the support arm to the operative position.

5 3. Inking/coating apparatus (10) as set forth
in claim 1, characterized in that a counterweight (100,
102) is coupled to the carriage assembly.

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10 4. Inking/coating apparatus (10) as set forth
in claim 1, wherein the applicator head (60) is character-
ized by:

 a doctor blade assembly (68) having a
reservoir (70) for receiving ink or liquid coating mate-
rial; and,

15 an applicator roller (66) coupled to the
doctor blade assembly in fluid communication with the
reservoir, the applicator roller being engagable with a
printing plate (P) on the plate cylinder or with a blanket
(B) on the blanket cylinder when the applicator head (60)
20 is in the operative position.

 5. Inking/coating apparatus (10) as set forth
in claim 4, characterized in that the applicator roller
(66) is an anilox roller having a resilient transfer
25 surface.

6. Inking/coating apparatus (10) as set forth in claim 1, characterized in that:

a power actuator (104, 106) is movably coupled to the applicator head (60), the power actuator having a power transfer arm (104A, 106A) which is extendable and retractable; and,

movement converting apparatus (108) is coupled to the power transfer arm for converting extension or retraction movement of the power transfer arm into pivotal movement of the applicator head (60) relative to the carriage assembly.

7. Inking/coating apparatus (10) as set forth in claim 6, wherein the movement converting apparatus (108) is characterized by:

a bell crank plate (111) having a first end portion coupled to the power transfer arm and having a second end portion for engaging a stop member;

a stop member (119) secured to the applicator head (60); and,

a clevis plate (115) secured to the carriage assembly (58) and pivotally coupled to the bell crank plate.

8. Inking/coating apparatus (10) as set forth in claim 1, wherein the applicator head (60) is characterized by:

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first and second side frame members (74, 76) pivotally coupled to the carriage assembly (58);

5 a doctor blade assembly mounted on the first and second side frame members, the doctor blade assembly including a reservoir (70) for receiving ink or liquid coating material;

 a cradle assembly (78, 80), (82, 84) mounted on the first and second side frame members, respectively;

10 an applicator roller (66) mounted for rotation on the cradle assembly and coupled to the doctor blade assembly for rolling contact with ink or coating material in the reservoir, the applicator roller being engagable with a printing plate (P) on the plate cylinder (32) or with a blanket (B) on the blanket cylinder (34) 15 when the applicator head (60) is in the operative position; and,

 a drive motor (62) coupled to the applicator roller for rotating the applicator roller.

9. Inking/coating apparatus (10) as set forth 20 in claim 8, characterized in that:

 the cradle assembly (79, 80) has first and second sockets (79, 81) disposed on the first and second side frame members respectively; and,

25 the applicator roller (66) is mounted for rotation on the first and second sockets.

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10. Inking/coating apparatus (10) as set forth
in claim 8, characterized in that

the cradle assembly (78, 80), (82, 84)
includes first and second sockets (79, 81) disposed on the
5 first and second side frame members, respectively, and
third and fourth sockets disposed on the first and second
side frame members, respectively; and,

10 the applicator roller (66) is selectively
mountable for rotation on either the first and second
sockets or on the third and fourth sockets for applying ink
or coating material to either the plate or blanket when the
applicator head is in the operative position.

15 11. Inking/coating apparatus (10) as set forth
in claim 1, wherein the applicator head (60) is character-
ized by:

a first cradle (78, 80) for supporting an
applicator roller (66) for engagement with the plate when
the inking/coating apparatus is in the operative position;
and

20 a second cradle (82, 84) for supporting an
applicator roller (66) for engagement with the blanket (B)
when the inking/coating apparatus is in the operative
position.

25 12. Inking/coating apparatus (10) as set forth
in claim 1, wherein the carriage assembly is characterized
by:

00000000000000000000000000000000

a support arm (88, 90) having a first end portion pivotally coupled to the printing unit (88A, 90A) and having a second end portion (88B, 90B);

5 support arm second end portion and the inking/coating apparatus are pivotally mounted; and,

10 male and female latch members (103, 105) coupled between the common pivot shaft and the printing unit, with one of the latch members being secured to the common pivot shaft and the other latch member being constructed for attachment onto the printing unit, the latch members being mateable in interlocking engagement when the applicator head (60) is in the operative position.

13. Inking/coating apparatus (10) as set forth
15 in claim 1, wherein the applicator head (60) and the printing unit are characterized by:

20 male and female latch coupling members (103, 105) mounted on the carriage assembly (58) and on the printing unit for releasably latching the carriage assembly in interlocking engagement with the printing unit when the applicator head is in the operative position.

14. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) is characterized by an elongated shank portion (88B, 90B) and a hub portion (88A, 90A), the elongated shank portion being pivotally coupled to the applicator head (60) and the hub

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portion being constructed for pivotal attachment onto the printing unit.

15. A rotary offset printing press (12) having first and second printing units (22, 24) and the ink-
5 ing/coating apparatus (10) of claim 1 is movably coupled to the first printing unit (22) as set forth in claim 1, characterized by:

a dryer (112) mounted on the first printing unit adjacent the impression cylinder (36) of the first
10 printing unit for discharging heated air onto a freshly printed substrate while the freshly printed substrate is in contact with said impression cylinder.

16. A rotary offset printing press (12) as defined in claim 15, characterized in that:

15 an extractor (112E) is disposed adjacent the dryer for extracting hot air, moisture and volatiles from an exposure zone (Z) between the dryer and the freshly printed substrate.

17. A rotary offset printing press (12) as
20 defined in claim 15, characterized in that:

an intermediate transfer cylinder (40) is coupled in sheet transfer relation with the impression cylinder (36) of the first printing unit (22); and,

25 an interstation dryer (114) is disposed adjacent the intermediate transfer cylinder for discharging

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heated air onto a freshly printed or coated substrate after it has been transferred from the impression cylinder of the first printing unit and while it is in contact with the intermediate transfer cylinder (40).

- 5 18. A method for rotary offset printing in a printing press (12) of the type including first and second rotary offset printing units (22, 24), and using aqueous or UV-curable printing ink or coating material in the operation of at least the first printing unit, characterized by
10 the following steps performed at each printing unit in succession:

 spot or overall coating a plate (P) with aqueous ink/aqueous coating material or UV-curable ink/UV-curable coating material;

- 15 spot and/or overall coating a blanket (B) with aqueous ink/aqueous coating material or UV-curable ink or UV-curable coating material;

 transferring the printing ink or coating material from the printing plate (P) to the blanket (B);

- 20 transferring the inked or coated image from the blanket to a substrate (S) as the substrate is transferred through the nip between the impression cylinder (36) and the blanket (B); and,

- 25 drying the ink or coating material on the freshly printed substrate before the substrate is subsequently processed.

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19. A method for rotary offset printing as defined in claim 18, wherein the drying step is characterized by:

discharging high velocity, heated air onto
5 the freshly printed/coated substrate (S) while the freshly printed/coated substrate is in contact with the impression cylinder (36) of the first printing unit (22).

20. A method for rotary offset printing as defined in claim 18, characterized by the steps:

10 transferring the freshly printed substrate (S) from the first printing unit (22) to an intermediate transfer cylinder (40); and,

drying the freshly printed substrate while it is in contact with the intermediate transfer cylinder.

15 21. A method for rotary offset printing as defined in claim 18, characterized by the step:

extracting hot air, moisture and volatiles from an exposure zone (Z) above the freshly printed/coated substrate (S) while the freshly printed/coated substrate is
20 in contact with the impression cylinder (36).

22. A method for rotary offset printing as defined in claim 18, characterized by the steps:

applying a primer coating of an aqueous coating material or UV-curable coating material to a
25 substrate (S) in the first printing unit (22); and,

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drying the primer coating on the substrate
before the substrate is processed in the second printing
unit.

"RETRACTABLE INKING/COATING APPARATUS
HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS"

ABSTRACT

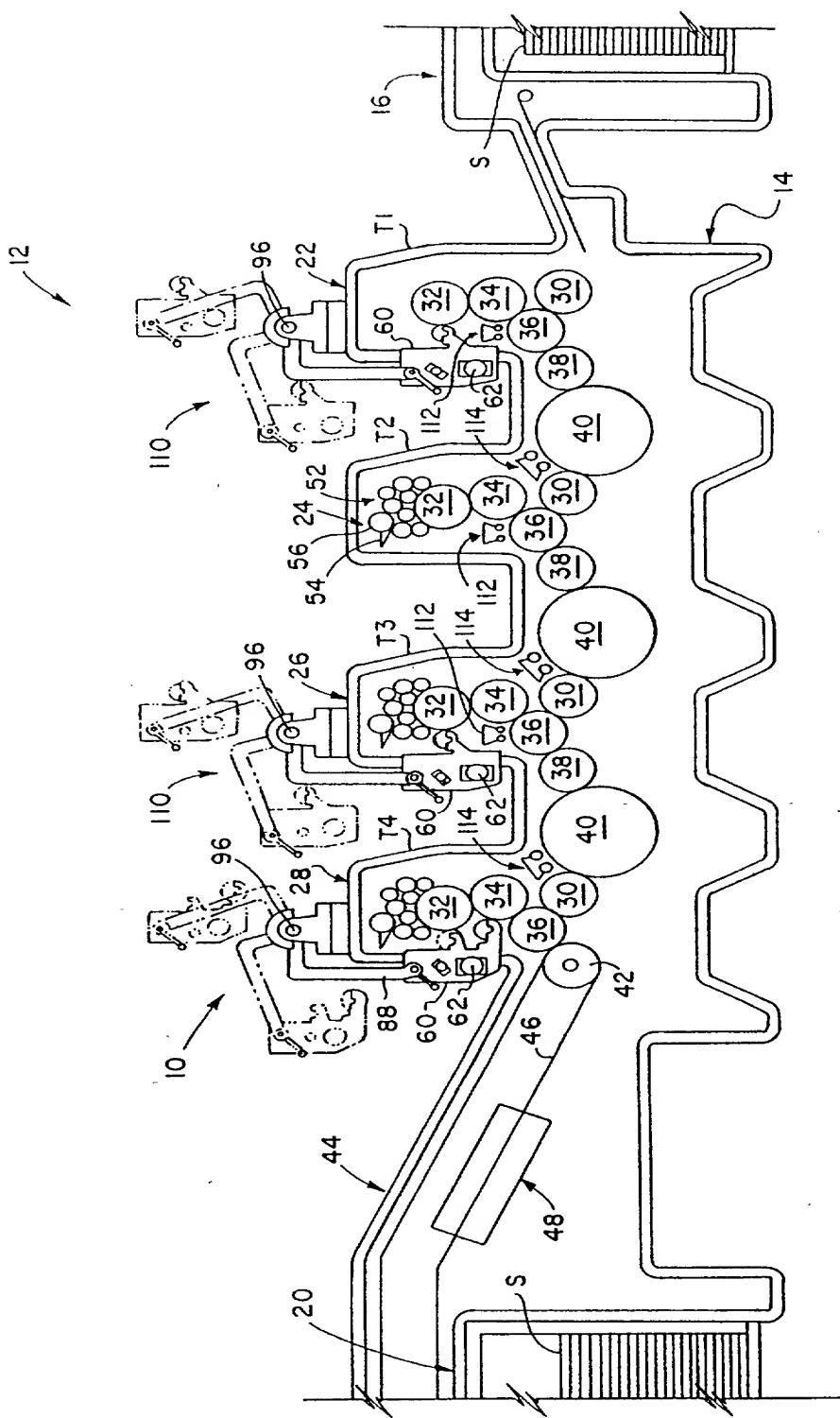
A retractable in-line inking/coating apparatus (10) selectively applies either spot or overall ink/coating material to a blanket (B) or flexographic plate (P) on a blanket cylinder (34), or spot or overall ink/coating to a flexographic printing plate (P) on a plate cylinder (32) in a rotary offset printing press (12). The inking/coating apparatus is pivotally mounted on a printing unit (22, 24, 26, 28) or dedicated coating unit, and is extendable into and retractable out of an operative inking/coating position by a carriage assembly (58) which is pivotally coupled to the printing unit. Because of the pivotal support provided by a cantilevered support arm (88, 90), the inking/coating apparatus is extended and retracted through a Ferris wheel arc between adjacent printing units.

FIG. 1

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FIG. 1



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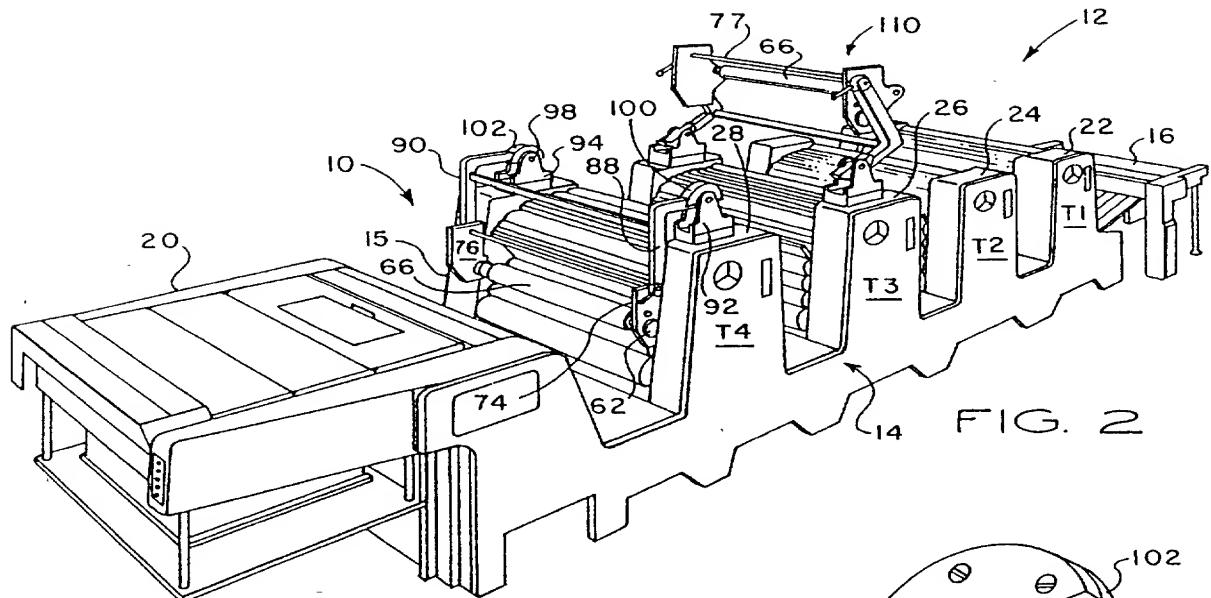


FIG. 2

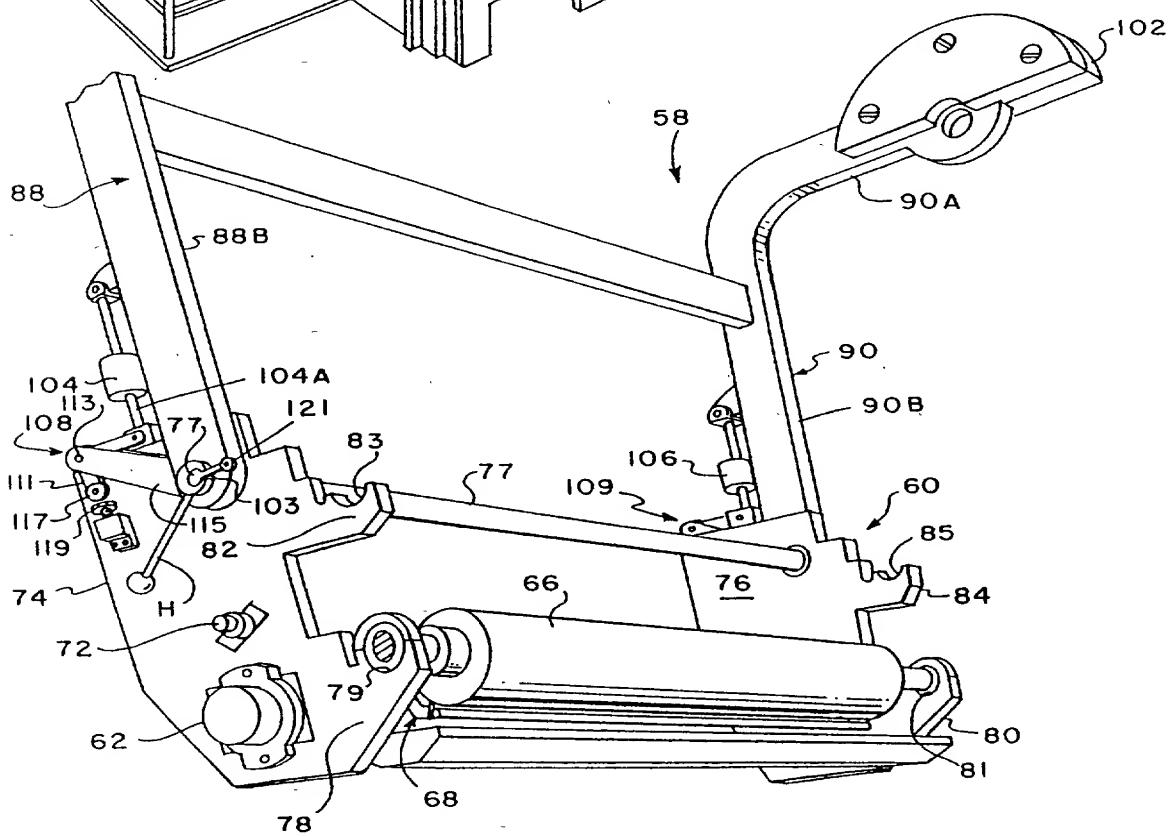


FIG. 3

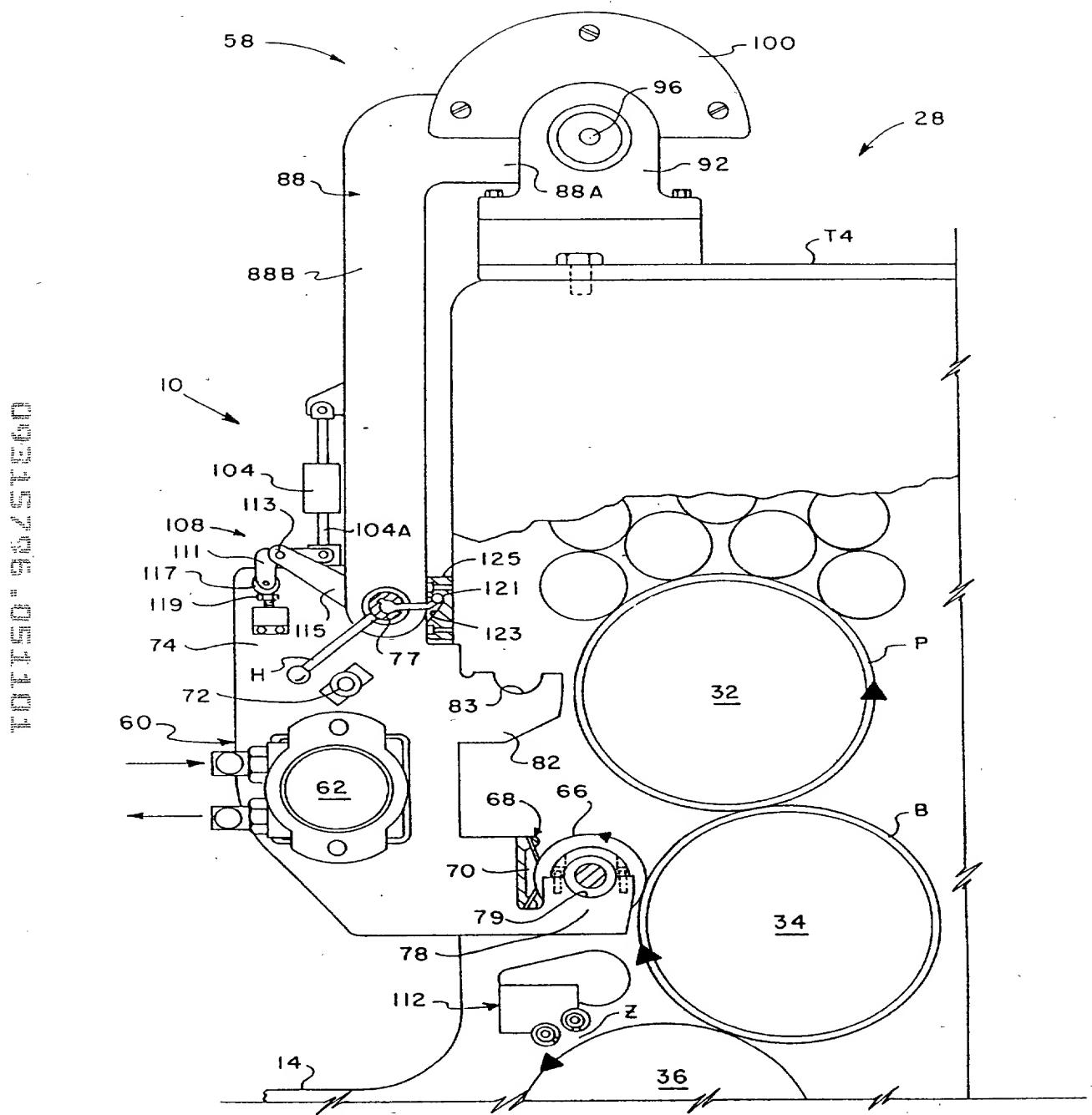
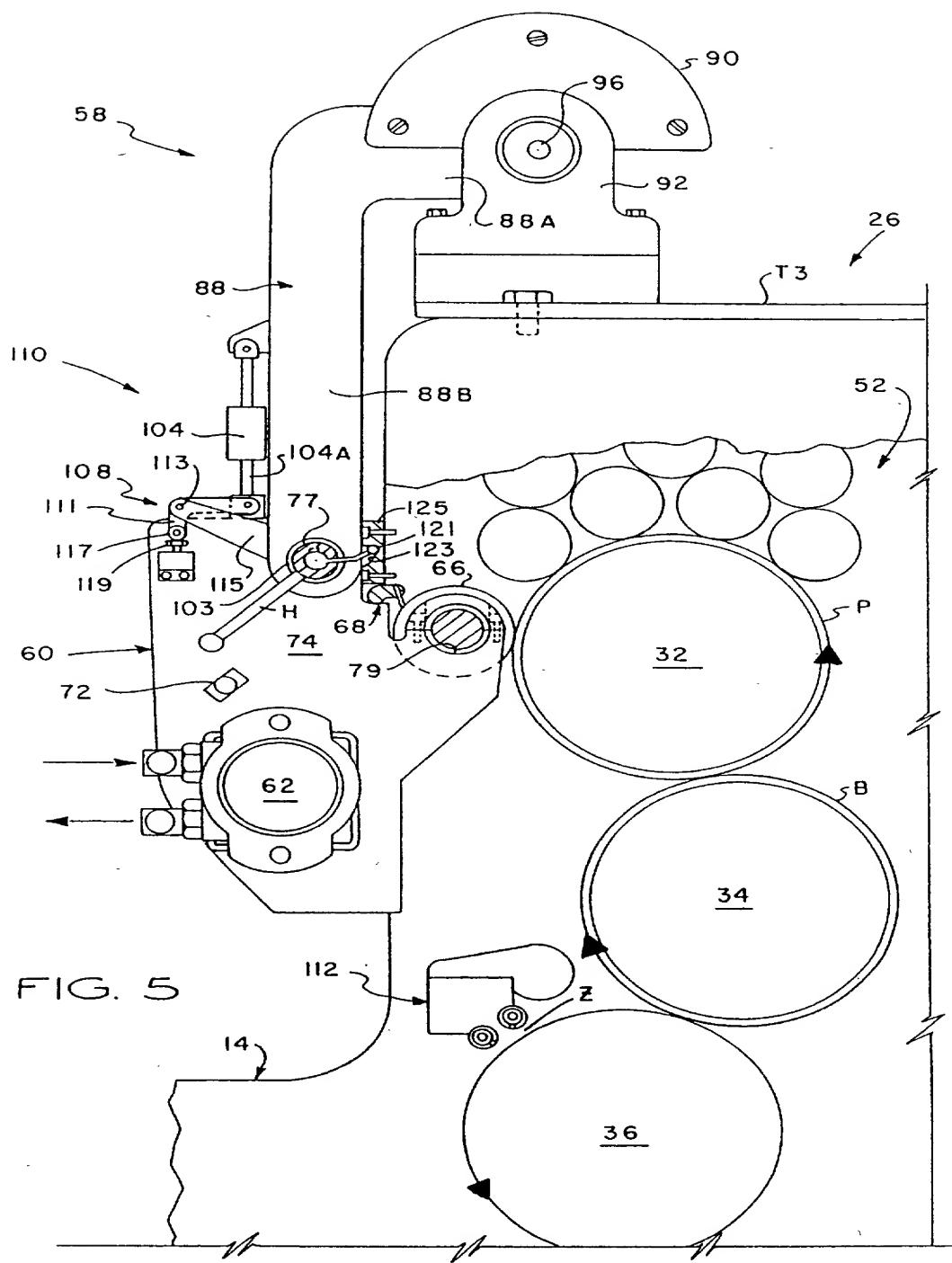


FIG. 4

PCT Patent Application



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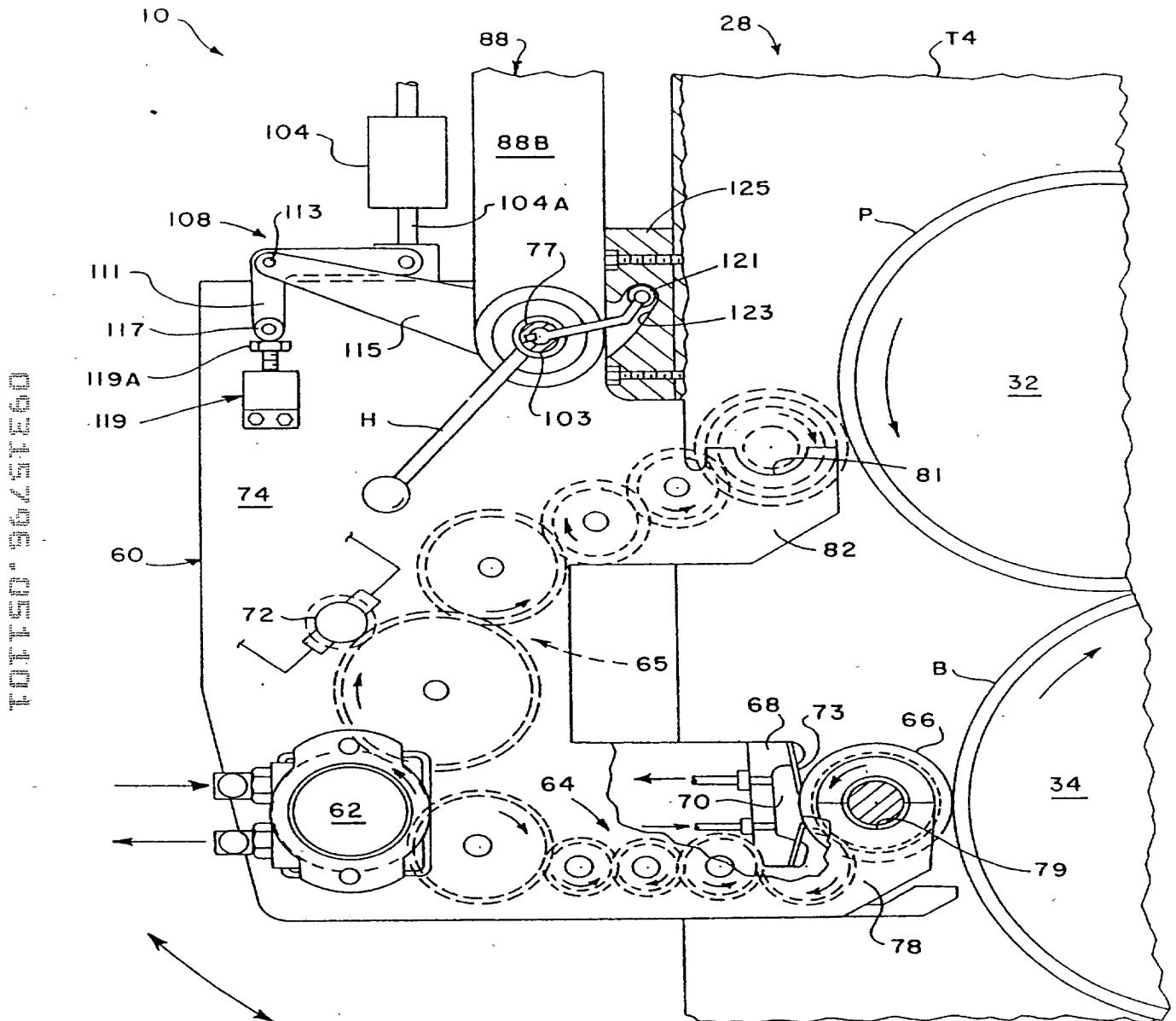


FIG. 6

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Dear Sirs

European Patent Application No. 96303136.4
DEMOORE, HOWARD WARREN
Our Ref: HAG/FP5233994

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APPLICATION NUMBER: 08/435,798 ✓
FILING DATE: May 4, 1995 ✓



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SPECIFICATION
accompanying
Application for Grant of U.S. Letters Patent

JOINT
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TITLE: "RETRACTABLE INKING/COATING APPARATUS HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS"

Field of the Invention

1 This invention relates to sheet-fed or web-fed, rotary
2 offset or flexographic printing presses, and more particularly, to
3 a new and improved inking/coating apparatus for the in-line
4 application of printing inks or protective or decorative coatings
5 to sheets or web.

Background of the Invention

7 Conventional sheet-fed, rotary offset printing presses
8 typically include one or more printing units through which
9 individual sheets are fed and printed with wet ink. After the
10 last printing unit, the sheets are transferred by a delivery
11 conveyor to the delivery end of the press where the freshly
12 printed sheets are collected and stacked. In a typical sheet-fed,
13 rotary offset printing press such as the Heidelberg Speedmaster
14 line of presses, the delivery conveyor includes a pair of endless
15 gripper chains carrying gripper bars and gripper fingers which
16 grip and pull freshly printed sheets from the last impression
17 cylinder and convey the sheets to the sheet delivery stacker.

1 Since the inks used with rotary offset printing presses
2 typically remain wet and tacky for some time after printing,
3 special precautions must be taken to insure that the freshly
4 printed sheets are not marked or smeared as the sheets are
5 transferred from one printing unit to another, and while being
6 conveyed to the sheet delivery stacker. The printed surface of
7 the sheet dries relatively slowly and can be smeared during
8 subsequent transfer between printing units. In order to reduce
9 smearing and offsetting, spray powder is applied on the printed
10 sheet.

11 In some printing applications, offset and smearing are
12 prevented by applying a protective and/or decorative coating over
13 all or a portion of the freshly printed sheets. Some coating
14 solutions include varnish, lacquer, dye, moisturizers and ink.
15 Such coatings are formed of a UV-curable or water-dispersed resin
16 applied as a liquid solution or emulsion over the freshly printed
17 sheets to protect the ink and improve the appearance of the
18 freshly printed sheets. Such coatings are particularly desirable
19 when decorative or protective finishes are required such as in the
20 production of posters, record jackets, brochures, magazines,
21 folding cartons and the like. The coating is permeable to oxygen
22 to permit drying of the ink. In cases where a liquid coating is
23 to be applied, the coating operation is carried out after the last
24 color ink has been printed. In some cases, it is desirable to
25 spot coat from the printing plate. For both operations, the
26 coating is most desirably performed by an in-line coater.

27 In printing presses having flexographic printing plates,
28 an aqueous ink is used, for example metallic (gold) ink and opaque
29 white ink, both of which can be overprinted at the next printing
30 unit. An advantage of flexographic printing is that no dampening
31 unit is required. The flexographic printing plate has a raised
32 image surface (relief). Colors are stronger when flexographic
33 inks are used because they are not diluted by dampening solution.

1 Description of the Prior Art

2 Various arrangements have been made for applying the
3 coating as an in-line printing operation by using the last
4 printing unit of the press as the coating application unit. For
5 example, in U.S. Patents 4,270,483, 4,685,414 and 4,779,557, there
6 are disclosed coating apparatus which can be moved into position
7 to allow the blanket cylinder of the last printing unit of a press
8 to be used to apply a coating material to the sheets. In U.S.
9 Patent 4,796,556 and U.S. Patent 4,841,903 there is disclosed a
10 coating apparatus which can be selectively moved between the
11 blanket cylinder or the plate cylinder of the last printing unit
12 of the press so that the last printing unit can only be used for
13 coating purposes. However, when coating apparatus of these types
14 are used, the last printing unit cannot be used to apply ink to
15 the sheets, but rather can only be used for the coating operation.
16 Thus, while coating with these types of in-line coating apparatus,
17 the press loses the capability of printing its full range of
18 colors since the last printing unit is converted to a coating
19 unit.

20 Proposals for overcoming the problem of the loss of a
21 printing unit when in-line coating is desired have also been made,
22 such as that set forth in U.S. Patent 4,934,305 which discloses a
23 coating apparatus having a separately timed applicator roller
24 positioned to apply the coating material to the freshly printed
25 sheet while the sheet is on the last impression cylinder of the
26 press. This is said to allow the last printing unit to print and
27 coat simultaneously, so that no loss of a printing unit capability
28 results. Another approach to providing a coating unit without
29 losing the printing capabilities of the last printing unit is to
30 provide a totally separate coating unit downstream of the last
31 printing unit so that the coating is applied to the sheets after
32 the last printing unit. Such an arrangement is disclosed in U.S.
33 Patents 4,399,767, 4,706,601 and 5,176,077.

34 In an effort to reduce costs and maintain flexibility in
35 adapting the printing press to different jobs, coating apparatus

1 has been provided that can be selectively engaged with the plate
2 cylinder or blanket cylinder to carry out the coating operation,
3 and disengaged so that the last printing unit can be used for
4 offset printing when coating is not required. Examples of coaters
5 which are selectively engagable with either the plate cylinder or
6 the blanket cylinder are disclosed in U.S. Patent 4,615,293
7 (Jahn), U.S. Patent 5,107,790 (Sliker et al.) and U.S. Patent
8 4,841,903 (Bird).

9 The coater of U.S. Patent 4,615,293 includes two
10 applicator rollers, both disposed on the dampening side of the
11 plate cylinder and blanket cylinder for carrying out spot and
12 blanket coating operations as desired. The coater of U.S. Patent
13 5,107,790 is retractable along an inclined rail for extending and
14 retracting a coater head into engagement with either the plate
15 cylinder or the blanket cylinder. Because of its size, the
16 rail-retractable coater can only be installed between the last
17 printing unit of the press and the delivery stacker, and cannot be
18 used at interstation positions. The coaters of Patent 4,615,293
19 are located on the dampener side of the plate and blanket cylinders,
20 thus requiring removal of the dampening unit to make room
21 for the doctor blade head and applicator rollers. Consequently,
22 the last printing unit of the press is converted into a coating
23 unit, resulting in the loss of the printing capability of that
24 printing unit.

25 It will be appreciated that the time required to
26 reconfigure a press for coating or non-coating is non-productive
27 and costly. Accordingly, there is a need for a coating apparatus
28 which minimizes the time to clean-up from one printing run and set
29 up and run the next job. Where consecutive jobs require the same
30 type of coating, particularly blanket coating, it may not be
31 necessary to clean-up the coater between jobs. However, the
32 coating cannot be allowed to dry on the rollers. Therefore,
33 especially when switching from blanket to spot coating or vice
34 versa, or if there is a delay between jobs, it is necessary to
35 wash-up the coater after each job is completed.

1 In addition, wash-up is necessary when switching between
2 different coating compositions, such as aqueous and ultra-violet
3 (UV) curable coatings. Such coatings are not interchangeable, and
4 the coaters must be washed between applications of the different
5 coating media. It is difficult to wash-up some coaters while the
6 press is running. Moreover, the retractable coaters mentioned
7 above occupy a large amount of press space and diminishes
8 accessibility to the press. Elaborate equipment is needed for
9 retracting the coater from the operative coating position to an
10 out-of-the-way, inoperative position which reduces access to the
11 printing unit.

12 A limitation on the use of flexographic printing plates
13 and aqueous printing inks is that the freshly printed or coated
14 sheets require hot air for drying. When applying an aqueous ink
15 such as opaque white or metallic gold, it is necessary to dry the
16 printed sheets between printing units before overprinting them.

17 Moreover, when utilizing lithographic printing inks, it
18 is necessary to frequently stop the press and wash the blanket.
19 Metallic ink in particular "piles" on the blanket and must be
20 washed frequently.

21 Objects of the Invention

22 Accordingly, the principal object of the present
23 invention is to provide improved inking/coating apparatus which is
24 capable of selectively applying ink or a coating material to a
25 plate on a plate cylinder or a coating material to a blanket on a
26 blanket cylinder of a printing press.

27 Another object of the present invention is to provide
28 inking/coating apparatus of the character described which is
29 extendable into inking/coating engagement with either a plate
30 cylinder or a blanket cylinder, and which is retractable to a non-
31 operative position to provide clear access to the cylinders of the
32 printing unit.

33 A related object of the present invention is to provide
34 inking/coating apparatus of the character described which is

1 capable of being used in an interstation position and does not
2 interfere with access to the press.

3 Yet another object of the present invention is to
4 provide inking/coating apparatus of the character described, which
5 can be moved from an operative inking/coating engagement position
6 to a non-operative, retracted position.

7 Still another object of the present invention is to
8 provide inking/coating apparatus of the character described, which
9 can be used for applying aqueous inks and coatings to a litho-
10 graphic printing plate or a flexographic printing plate in a
11 rotary offset press.

12 A related object of the present invention is to provide
13 inking/coating apparatus of the character described, which is
14 capable of applying aqueous coating at one printing unit and
15 drying the coating before it reaches the next printing unit where
16 it can be overprinted with aqueous ink or lithographic ink.

17 Another object of the present invention is to provide
18 inking/coating apparatus for use on a multiple color rotary offset
19 printing press that can apply ink or coating to the plate or
20 blanket of a printing unit from a single applicator head.

21 A related object of the invention is to provide
22 inking/coating apparatus of the character described, in which no
23 printing unit adjustment or alteration is required when the
24 applicator head is converted from plate to blanket operation and
25 vice versa.

26 Summary of the Invention

27 The foregoing objects are achieved by a retractable, in-
28 line inking/coating apparatus which is mounted on a printing unit
29 tower for pivotal, Ferris wheel type movement between an operative
30 inking/coating position and a retracted, overhead position. The
31 inking/coating apparatus includes an applicator head which extends
32 into and retracts out of engagement with a plate on a plate
33 cylinder or a blanket on a blanket cylinder. The inking/coating
34 applicator head is positioned in parallel alignment with either

1 the plate cylinder or the blanket cylinder by a carriage assembly
2 which includes a cantilever support arm. The support arm is
3 pivotally coupled between the inking/coating head and the printing
4 unit tower. This cantilevered, pivotal mounting arrangement
5 allows the inking/coating unit to be used between two printing
6 units, as well as installed on the last printing unit of the
7 press.

8 In the preferred embodiment, the applicator head
9 includes vertically spaced pairs of cradle members with one cradle
10 pair being adapted for supporting a metal or ceramic coating
11 roller in alignment with a blanket cylinder, and the other cradle
12 pair supporting a resilient anilox coating roller in alignment
13 with the plate cylinder, respectively, when the applicator head is
14 in the operative position. Because of the cantilevered, pivotal
15 support provided by the support arm, the applicator head can be
16 lifted and lowered through an arc, similar to Ferris wheel
17 movement, in the limited space between adjacent printing units.
18 When fully retracted, the coater and carriage assembly are lifted
19 to an overhead position overlying the printing unit tower, thus
20 providing complete access to the printing unit cylinders, without
21 causing the printing unit to lose its printing capability. The
22 inking/coating applicator roller can be inspected, cleaned or
23 replaced and the doctor blade assembly can be washed-up automatic-
24 cally while the inking/coating apparatus is in the fully retracted
25 position.

26 When the inking/coating apparatus is used in combination
27 with a flexographic printing plate and aqueous ink or aqueous
28 coating, the water component of the aqueous ink or coating on the
29 freshly printed sheet is evaporated by a high velocity, hot air
30 interstation dryer and a high volume heat and moisture extractor
31 assembly so that the freshly printed ink or coating is completely
32 dry before the sheet is printed on the next printing unit. This
33 quick drying flexographic printing/coating arrangement permits a
34 base coat of ink, for example opaque white or metallic ink (gold,
35 silver or other metallics) to be applied in the first printing

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1 unit, and then overprinted by the lithographic process on the next
2 printing unit.

3 Other features and advantages of the present invention
4 will become more apparent from the following detailed description
5 taken in conjunction with the accompanying drawings which
6 disclose, by way of example, the principles of the present
7 invention.

8 Brief Description of the Drawings

9 FIGURE 1 is a schematic side elevational view of a
10 sheet-fed, rotary offset printing press having inking/coating
11 apparatus embodying the present invention;

12 FIGURE 2 is a perspective view of the printing press of
13 FIGURE 1 in which a dual head inking/coating apparatus is in the
14 operative coating position and a single head coater is in a
15 retracted, overhead position;

16 FIGURE 3 is an enlarged simplified perspective view
17 showing one side of the single head inking/coating apparatus of
18 FIGURE 1 in the operative position;

19 FIGURE 4 is a simplified side elevational view showing
20 the dual head inking/coating apparatus in the operative coating
21 position for spot or overall coating from the blanket position;

22 FIGURE 5 is a simplified side elevational view showing
23 the single head inking/coating apparatus in the operative coating
24 position for spot or overall coating from the plate position; and,

25 FIGURE 6 is a simplified side elevational view of the
26 dual head inking/coating apparatus of FIGURE 4, partially broken
27 away, which illustrates the hydraulic drive assembly and doctor
28 blade assembly.

29 Detailed Description of the Preferred Embodiments

30 As used herein, the term "processed" refers to various
31 printing methods which may be applied to either side of a
32 substrate, including the application of UV-curable and aqueous
33 inks and/or coatings. The term "substrate" refers to sheet or web

1 material. Also, as used herein, the term "waterless printing
2 plate" refers to a printing plate having non-image surface areas
3 which are hydrophobic and also having image surface areas which
4 are hydrophilic, wherein the non-image surface areas are character-
5 terized by a surface tension value which is less than the surface
6 tension of aqueous ink, and the image surface areas are character-
7 ized by a surface tension value which is greater than the surface
8 tension of aqueous ink. "Flexographic" refers to flexible
9 printing plates having a relief surface which is wettable by
10 aqueous ink or coating material.

11 As shown in the exemplary drawings, the present
12 invention is embodied in a new and improved in-line inking/coating
13 apparatus, herein generally designated 10, for use in applying
14 inks or protective and/or decorative coatings to sheets or webs
15 printed in a sheet-fed or web-fed, offset rotary or flexographic
16 printing press, herein generally designated 12. In this instance,
17 as shown in FIGURE 1, the inking/coating apparatus 10 is installed
18 in a four color printing press 12, such as that manufactured by
19 Heidelberg Druckmaschinen AG of the Federal Republic of Germany
20 under its designation Heidelberg Speedmaster 102V (40"). The
21 press 12 includes a press frame 14 coupled at one end, herein the
22 right end, to a sheet feeder 16 from which sheets, herein
23 designated S, are individually and sequentially fed into the
24 press, and at the opposite end, with a sheet delivery stacker 20
25 in which the freshly printed sheets are collected and stacked.
26 Interposed between the sheet feeder 16 and the sheet delivery
27 stacker 20 are four substantially identical sheet printing units
28 22, 24, 26 and 28 which can print different color inks onto the
29 sheets as they are transferred through the press 12. The printing
30 units are housed within printing towers T1, T2, T3 and T4 formed
31 by side frame members 14, 15.

32 As illustrated, the printing units 22, 24, 26 and 28 are
33 substantially identical and of conventional design. The first
34 printing unit 22 includes an in-feed transfer cylinder 30, a plate
35 cylinder 32, a blanker cylinder 34 and an impression cylinder 36,

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1 all supported for rotation in parallel alignment between the press
2 side frames 14, 15 which define printing unit towers T1, T2, T3
3 and T4. Each of the first three printing units 22, 24 and 26 have
4 a transfer cylinder 38 disposed to withdraw the freshly printed
5 sheets from the adjacent impression cylinder and transfer the
6 freshly printed sheets to the next printing unit via an inter-
7 station transfer cylinder 40. The last printing unit 28 is shown
8 equipped with a delivery cylinder 42 which supports the printed
9 sheet 18 as it is transferred from the last impression cylinder 36
10 to a delivery conveyor system, generally designated 44, to the
11 sheet delivery stacker 20.

12 The delivery conveyor system 44 as shown in FIGURE 2 is
13 of conventional design and includes a pair of endless delivery
14 gripper chains 46, only one of which is shown carrying at regular
15 spaced locations along the chains, laterally disposed gripper bars
16 having gripper fingers used to grip the leading edge of a freshly
17 printed sheet 18 after it leaves the nip between the delivery
18 cylinder 42 and impression cylinder 36 of the last printing unit
19 28. As the leading edge is gripped by the grippers, the delivery
20 chains 46 pull the sheet away from the impression cylinder 36 and
21 convey the freshly printed sheet to the sheet delivery stacker 20.

22 Prior to reaching the delivery sheet stacker, the
23 freshly printed and/or coated sheets 8 pass under a delivery dryer
24 48 which includes a combination of infra-red thermal radiation,
25 high velocity hot air flow and a high performance heat and
26 moisture extractor for drying the ink and/or the protec-
27 tive/decorative coating.

28 In the exemplary embodiment shown in FIGURE 1, the first
29 printing unit 22 is equipped with a flexographic printing plate,
30 and does not require an inking roller train or a dampening system.
31 If an ink roller train is mounted on the first printing unit, the
32 form rollers are retracted and locked off when the printing unit
33 goes on impression. Flexographic aqueous ink is supplied by the
34 inking/coating unit 110. The remaining printing units 24, 26 and
35 28 are equipped for lithographic printing and include an inking

1 apparatus 50 having an inking roller train 52 arranged to transfer
2 ink from an ink fountain 54 to the plate cylinder 32. This is
3 accomplished with the aid of a fountain roller 56 and a doctor
4 roller. The fountain roller 56 projects into the ink fountain 54,
5 whereupon its surface is wetted with ink. The printing ink Q is
6 transferred intermittently to the inking roller train 52 by the
7 doctor roller. The inking roller train 52 supplies ink Q to the
8 image areas of a printing plate P mounted on the plate cylinder 32.

9 The printing ink Q is transferred from the printing
10 plate P to an ink receptive blanket B which is mounted on the
11 blanket cylinder 34. The inked image carried on the blanket B is
12 transferred to a sheet S as the sheet is transferred through the
13 nip between the impression cylinder 36 and the blanket B.

14 The inking roller arrangement 52 illustrated in FIGURE
15 1 is exemplary for use in combination with lithographic ink
16 printing plates. It will be understood that dampening rollers
17 (not illustrated) will be in direct engagement with the litho-
18 graphic plate P, but are not used in combination with the
19 flexographic plate of printing unit 22.

20 Referring now to FIGURE 4, FIGURE 5 and FIGURE 6, the
21 in-line inking/coating apparatus 10 includes a carriage assembly
22 58 which supports an applicator head 60. The applicator head 60
23 includes a hydraulic motor 62, a lower gear train 64, an upper
24 gear train 65, an applicator roller 66 and a doctor blade assembly
25 68. The external peripheral surface of the applicator roller 66
26 is inserted into wetting contact with liquid coating material or
27 ink contained in a reservoir 70. The reservoir is continuously
28 supplied with ink or coating which is circulated through the
29 reservoir 70 from an off-press source by a pump (not illustrated).
30 The hydraulic motor 62 drives the applicator roller 66 synchron-
31 ously with the plate cylinder 32 and the blanket cylinder 34 in
32 response to an RPM control signal from the press drive (not
33 illustrated) and a feedback signal developed by a tachometer 72.
34 While a hydraulic drive motor is preferred, an electric drive
35 motor can be used.

1 The fluid metering applicator 66 is preferably an anilox
2 roller which transfers measured amounts of printing ink or coating
3 material onto the printing plate or blanket. The surface of an
4 anilox roller is engraved with an array of closely spaced, shallow
5 depressions referred as "cells". Ink or coating from the
6 reservoir 70 flows into the cells as the anilox roller turns
7 through the reservoir. The transfer surface of the anilox roller
8 is scraped with a doctor blade 73 to remove excess ink or coating.
9 The ink or coating remaining on the anilox roller is that
10 contained within the cells.

11 The anilox roller 66 is cylindrical and may be con-
12 structed in various diameters and lengths, containing cells of
13 various sizes and shapes. The volumetric capacity of an anilox
14 roller is established during manufacturing and is dependent upon
15 the selection of cell size, shape and number of cells per unit
16 area. Depending upon the intended application, the cell pattern
17 may be fine (many small cells per square inch) or coarse (fewer
18 larger cells per square inch).

19 By applying the ink or coating through the inking/coat-
20 ing applicator 60, more ink or coating can be delivered to the
21 sheet S as compared with the inking roller train of a lithographic
22 printing unit. Moreover, color intensity is stronger and more
23 brilliant because the flexographic ink is applied at a much larger
24 film thickness than can be applied by the lithographic process and
25 is not diluted by dampening solution.

26 Preferably, the doctor blade assembly 68 is constructed
27 as described in U.S. Patent 5,176,077 (DeMoore), which is
28 incorporated herein by reference.

29 The applicator head 60 includes side frame members 74,
30 76 which support the applicator roller 66, gear train 64, gear
31 train 65, doctor blade assembly 68 and the drive motor 62. The
32 applicator roller 66 is supported at opposite ends on a lower
33 cradle formed by a pair of end plates 78, 80 which hold the
34 applicator roller 66 in parallel alignment with the blanket
35 cylinder 34 (FIGURE 5). The side frame 74, 76 are also provided

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1 with an upper cradle formed by a pair of side plates 82, 84 which
2 are vertically spaced with respect to the lower side plates 78,
3 80. Each cradle has a pair of sockets 79, 81 and 83, 85,
4 respectively, for holding an applicator roller 66 for spot coating
5 or inking engagement against the plate P of the plate cylinder 32
6 (FIGURE 4) or the blanket B of the blanket cylinder 34.

7 Preferably, the applicator roller 66 for the upper
8 cradle (plate) position is an anilox roller having a resilient
9 transfer surface. In the dual cradle arrangement, the press
10 operator can quickly change over from blanket inking/coating and
11 plate inking/coating with minimum press down time, since it is
12 only necessary to remove and reposition or replace the applicator
13 roller 66, and wash-up the doctor blade assembly if changing from
14 ink to coating or vice versa. The capability to selectively
15 operate in either the flexographic mode or the lithographic mode
16 and to print or coat from either the plate or blanket position is
17 referred to herein as the "LITHOFLEX" p

18 According to an important feature of the present
19 invention, the applicator head 60 is supported by the carriage
20 assembly 58 in a cantilevered, pivotal arrangement which allows
21 the dual cradle inking/coating apparatus 10 and single cradle
22 inking/coating apparatus 110 to be installed and used between any
23 two adjacent printing units, as well as installed on the first and
24 last printing units of the press. This is made possible by a pair
25 of cantilevered support arms 88, 90 which are pivotally coupled to
26 the side plates 74, 76, respectively, on a pivot shaft 77. Each
27 support arm has a hub portion 88A, 90A, respectively and an
28 elongated shank portion 88B, 90B, respectively. The elongated
29 shank portion extends transversely with respect to the shank
30 portion, and preferably extend perpendicularly with respect to
31 each other.

32 The cantilevered support arms are pivotally mounted on
33 the printing tower by pivot blocks 92, 94, respectively. The hub
34 portions 88A, 90A are journaled for rotation on pivot shafts 96,
35 98, respectively. The pivot blocks 92, 94 are securely fastened

1 to the tower 14D, so that the carriage assembly 86 is pivotally
2 suspended from the pivot shafts 96, 98 in a cantilevered Ferris
3 support arrangement. The shank portions 88B, 90B are pivotally
4 coupled to the pivot shaft 77, so that the carriage assembly 58
5 and the applicator head 60 are capable of independent rotation
6 with respect to each other with respect to the pivot shaft 77. By
7 this arrangement, the applicator head 60 is pivotally suspended
8 from the pivot shaft 77, and remains in an upright orientation as
9 the support arms rotate from the operative position to the fully
10 retracted position and vice versa.

11 Thus, the cradles 78, 80 and 82, 84 position the
12 applicator roller 66 in vertical and horizontal alignment with the
13 plate cylinder or blanket cylinder when the applicator head is
14 extended to the operative position. Moreover, because of the
15 transverse relationship between the hub portion and shank portion
16 of the support arms, the applicator head 60 and carriage assembly
17 58 are capable of rotating through a Ferris arc without touching
18 the adjacent tower. This makes it possible to install the
19 inking/coating apparatus 10 on any intermediate printing unit
20 tower (T2, T3), and as well as the first printing unit tower T1
21 and the last printing unit tower T4. Additionally, because of the
22 transverse relationship of the support arm hub portion and shank
23 portion, the lateral projection of the applicator head 60 into the
24 interstation space between printing units is minimized, thus
25 assuring virtually unrestricted operator access in the inter-
26 station space between adjacent printing units when the applicator
27 head is engaged in the operative position, and completely
28 unrestricted access when the applicator head is completely
29 retracted.

30 As shown in FIGURE 1 and FIGURE 2, rotation of the
31 carriage assembly 58 is counterclockwise from the retracted
32 position (shown in phantom) to the operative position. The
33 carriage assembly can be adapted for clockwise rotation from the
34 retracted position to the operative position for engagement of the
35 applicator roller to either the plate cylinder or the blanket

1 cylinder on the dampener side of the tower, assuming that access
2 to the plate and blanket is not restricted by dampener rollers or
3 the like.

4 Rotational movement of the support arms 88, 90 is
5 assisted by counterweights 100, 102 which are secured to the
6 support arms, respectively, for concurrent rotation with respect
7 to the pivot blocks 92, 94. With the passive assistance of the
8 counterweights, the press operator can easily move the inking/
9 coating assembly 10 from the engaged operative position as
10 shown in FIGURE 4 to the fully retracted idle position as shown in
11 phantom in FIGURE 1. Preferably, rotation of the carriage
12 assembly 58 is assisted by power means such as a torsion spring,
13 electric motor, or hydraulic motor.

14 The inking/coating apparatus 10 is releasably locked
15 into the engaged position as shown in FIGURE 4 by releasable latch
16 couplings 103, 105 which secure the support arms 88, 90 to the
17 press side frames 14, 15, respectively, of the printing unit tower
18 T4 in the operative position. Coating engagement of the applica-
19 tor roller 66 against the blanket cylinder 34 is produced by power
20 actuators, preferably pneumatic cylinders 104, 106 which have
21 extendable/retractable power transfer arms 104A, 106A, respective-
22 ly. The pneumatic cylinder 104 is pivotally coupled to the
23 support arm 88 by a pivot linkage 108, and the second pneumatic
24 cylinder 106 is pivotally coupled to the support arm 90 by a pivot
25 linkage 109. In response to actuation of the pneumatic cylinders
26 104, 106, the power transfer arms are retracted. As the arms
27 retract, the inking/coating head 60 is rotated counterclockwise on
28 the pivot shaft 77, thus moving the applicator roller 66 into
29 coating engagement with the blanket cylinder 34.

30 The pivot linkage 108 includes a bell crank 111 which is
31 mounted for pivotal movement on a pin 113. The pin 113 is
32 supported by a clevis plate 115 which is attached to the support
33 arm 88. One end of the bell crank is pivotally coupled to the
34 actuator arm 104A, and a cam roller 117 is mounted for rotation on
35 its opposite end.

1 The cam roller 117 is engagable against an adjustable
2 stop 119 which is rigidly secured to the side plate 74. Counterclockwise shifting of the handle H moves a cam follower 121 into
3 a latch pocket 123 of a receiver block 125 as the cam roller 117
4 is moved into engagement with the adjustable stop 119 in the
5 interlocked, operative position. Referring to FIGURE 4, FIGURE 5
6 and FIGURE 6, the receiver block is rigidly secured to the
7 delivery side face of the printing unit tower by machine screws.
8

9 When the plate P goes on impression, power is applied to
10 the pneumatic actuator 104 and the power transfer arm 104A
11 retracts, thus causing the bell crank 111 to rotate counterclockwise
12 about the pin 113. The torque applied by the actuator is
13 transmitted to the applicator head 60 through the cam roller 117
14 and the adjustable stop 119. Counterclockwise movement of the
15 applicator head 60 relative to the support shaft 77 carries the
16 applicator roller 66 into engagement with the plate P.

17 The adjustable stop 119 has a threaded bolt 119A which
18 is engagable with the cam roller 117. The striking point of
19 engagement is preset so that the applicator roller 66 is properly
20 positioned for engagement with the plate P or blanket B when the
21 applicator head 60 is interlocked with the press frame 14 and the
22 printing unit goes on impression.

23 Referring to FIGURE 5, an inking/coating apparatus 110
24 having a single head is illustrated. The construction of this
25 alternative embodiment is identical in all respects with the dual
26 head arrangement, with the exception that only a single gear train
27 and a single cradle for holding the applicator roller is provided.
28 In both embodiments, the inking/coating head 60 remains upright as
29 it swings through an arc, similar to the movement of a Ferris
30 wheel. Because of the upright orientation of the inking/coating
31 head 60 as it moves between the extended and retracted positions,
32 the usual platform spacing between printing unit towers provides
33 adequate clearance to permit extension and retraction of the
34 carriage assembly 58 without interference with operator access to
35 the printing units. This is a significant advantage in that it

1 permits the in-line inking/coating apparatus to operate effectively
2 in the interstation space between any adjacent printing units,
3 and without blocking or obstructing access to the cylinders of the
4 printing units when the inking/coating apparatus is in the fully
5 retracted position as indicated in FIGURE 1.

6 Moreover, when the in-line inking/coating apparatus is
7 in the fully retracted position, the applicator roller 66 is
8 conveniently positioned on the dampener side of the printing unit
9 for inspection, clean-up or removal. Additionally, the doctor
10 blade assembly is also conveniently positioned for inspection,
11 removal, adjustment or clean-up. The doctor blade reservoir and
12 coating circulation lines can also be cleaned while the printing
13 unit is running as well as when the press has been stopped for
14 change-over from one type of ink or coating to another.

15 When the inking/coating apparatus is used for applying
16 an aqueous ink or an aqueous coating material, the water component
17 on the freshly printed sheet S is evaporated by a high velocity,
18 hot air interstation dryer and high volume heat and moisture
19 extractor units 112 and 114, as shown in FIGURE 1, FIGURE 4 and
20 FIGURE 5. The dryer/extractor units 112 and 114 are oriented to
21 direct high velocity heated air onto the freshly printed/coated
22 sheet as it is transferred by the impression cylinder 36 and the
23 intermediate transfer cylinder 40. By this arrangement, the
24 freshly printed aqueous ink or coating is completely dry before
25 the sheet is overprinted in the next printing unit.

26 The high velocity, hot air dryer and high performance
27 heat and moisture extractor units 112, 114 utilize high velocity
28 air jets which scrub and break-up the moist air level which clings
29 to the surface of each freshly printed sheet. Within each dryer,
30 high velocity air is heated to a high temperature as it flows
31 across a resistance heating element within an air delivery baffle
32 tube. High velocity jets of hot air are discharged through
33 multiple airflow apertures through an exposure zone Z (FIGURE 4
34 and FIGURE 5) onto the freshly printed/coated sheet S as it is
35 transferred by the impression cylinder 36 and transfer cylinder

1 - 40, respectively. Each dryer assembly includes a pair of air
2 delivery dryer heads which are arranged in spaced, side-by-side.
3 relation. The high velocity, hot air dryer and high performance
4 heat and moisture extractor units 112, 114 are preferably
5 constructed as disclosed in co-pending U.S. Patent Application
6 Serial No. 08/132,584, filed October 6, 1993, entitled "High
7 Velocity Hot Air Dryer", assigned to the assignee of the present
8 invention and which is incorporated herein by reference.

9 The high velocity, hot moisture-laden air displaced from
10 each printed sheet is extracted from the dryer exposure zone Z and
11 completely exhausted from the printing unit by the high volume
12 extractors. Each extractor head includes a manifold coupled to
13 the dryer heads and draws the moisture, volatiles and high
14 velocity hot air through a longitudinal gap between the dryer
15 heads. According to this arrangement, each printed sheet is dried
16 before it is run through the next printing unit.

17 The water-based inks used in flexographic printing dry
18 at a relatively moderate drying temperature provided by the
19 interstation high velocity hot air dryers/extractors 112, 114.
20 Because each freshly printed sheet is dried between each printing
21 unit, clarity and print quality are substantially improved since
22 the aqueous ink is dried at each printing unit before it enters
23 the next printing unit. Since the aqueous ink is dry before the
24 sheet enters the next printing unit, back-trapping on the blanket
25 of the next printing unit is completely eliminated. This
26 interstation drying arrangement makes it possible to print aqueous
27 inks such as metallic ink and opaque white ink at one printing
28 unit, and then overprint at the next printing unit.

29 Moreover, this arrangement permits the first printing
30 unit to be used as a coater in which an aqueous coating is applied
31 to low grade paper such as recycled paper to trap and seal in
32 lint, dust, spray powder and other debris and provide a smoother,
33 durable surface which is overprinted in the next printing unit.
34 An UV-curable coating can be applied over the first down over-
35 printed (aqueous) coating in the last printing unit. The first

1 down layer seals the surface of the low grade, rough substrate and
2 improves overprinted dot definition while preventing strike-
3 through and show-through.

4 Preferably, the applicator roller 66 is either metal or
5 ceramic when it is used for applying a coating material to the
6 blanket B on the cylinder 34. When the applicator roller 66 is
7 applied to the plate, it is preferably constructed as an anilox
8 roller having a resilient transfer surface for engaging a
9 flexographic printing plate. Suitable resilient roller surface
10 materials include Buna N synthetic rubber and EPDM (terpolymer
11 elastomer).

12 It will be appreciated that the inking/coating apparatus
13 10 is capable of applying a wide range of ink types, including
14 fluorescent (Day Glo), pearlescent, metallics (gold, silver and
15 other metallics), glitter, scratch and sniff (micro-encapsulated
16 fragrance), scratch and reveal, luminous, pressure-sensitive
17 adhesives and the like.

18 The press operator can eliminate the dampener roller
19 assembly altogether, and the inking/coating apparatus 10 can
20 selectively apply aqueous inks and coatings to a flexographic or
21 waterless printing plate and the blanket. Moreover, overprinting
22 of the aqueous inks and coatings can be carried out in the next
23 printing unit since the aqueous inks and coatings are completely
24 dried by the high velocity, hot air interstation dryer and high
25 volume heat and moisture extractor assembly of the present
26 invention.

27 The aqueous inks and coatings as used in the present
28 invention contain colored pigments and/or soluble dyes, binders
29 which fix the pigments onto the surface of the printed sheet and
30 waxes, defoamers and thickeners. Aqueous printing inks predomi-
31 nantly contain water as a solvent, diluent and/or vehicle. The
32 thickeners which are preferred include algonates, starch,
33 cellulose and its derivatives, for example cellulose esters or
34 cellulose ethers and the like. Coloring agents including organic
35 as well as inorganic pigments may be derived from dyes which are

1 insoluble in water. Also, the printing ink may contain water and
2 may be predominantly glycol or the like, with the pigment being
3 bound by an appropriate resin. When metallic inks are printed,
4 the cells of the anilox roller must be appropriately sized to
5 prevent the metal particles from getting stuck within the cells.
6 The cell size is critical, and for metallic gold ink, the anilox
7 roller should have a screen line count in the range of 175-300
8 lines per inch.

9 The inking/coating apparatus 10 can also apply UV-
10 curable inks and coatings. If UV-curable inks and coatings are
11 utilized, ultra-violet dryers/extractors are installed adjacent
12 the high velocity hot air dryer/extractor units 112, 114,
13 respectively.

14 Moreover, by utilizing the coating apparatus on the
15 first printing unit, a seal coating can be applied to trap lint,
16 spray powder, dust and other debris, and cover defects on lower
17 grade paper which will improve print quality, which can then be
18 overprinted on the next in-line printing unit.

19 It will be appreciated that the "LITHOFLEX" system
20 described herein makes it possible to selectively operate a
21 printing unit in either the flexographic printing mode or the
22 lithographic printing mode, while also providing the capability to
23 print or coat from either the plate or blanket position. The dual
24 cradle support arrangement of the present invention makes it
25 possible to quickly change over from inking/coating at the blanket
26 cylinder position to inking/coating at the plate cylinder position
27 with minimum press down-time, since it is only necessary to remove
28 and reposition or replace the applicator roller 66 while the
29 printing/inking apparatus is in the retracted position.

30 Moreover, the press operator may elect to spot or
31 overall coat with aqueous ink/coating from the plate for one job,
32 and then spot and/or overall coat from the blanket during the next
33 job. Since the doctor blade assembly can be flushed and washed-up
34 quickly and the applicator roller can be changed out quickly, it
35 is possible to spot coat or overall coat from the plate position

1 - or the blanket position with aqueous inks or coatings during the
2 first press run and then spot coat or overall coat with UV-curable
3 inks or coatings from the plate position or from the blanket
4 position during the next press run. The inking/coating apparatus
5 is completely out of the way in the retracted position; conse-
6 quently, the doctor blade reservoir and supply lines may be
7 flushed and washed-up by automatic wash-up equipment while the
8 printing unit is printing another job.

9 The positioning of the applicator head and roller
10 assembly relative to the plate and blanket is repeatable to a pre-
11 determined, preset impression position. Consequently, no printing
12 unit adjustment or alteration is required, except for flushing the
13 doctor blade assembly and cleaning or replacing the applicator
14 roller to accommodate a different kind of ink or coating.
15 Although manual extension and retraction have been described in
16 connection with the exemplary embodiment, extension to the
17 operative position and retraction to a non-operative position can
18 be carried out automatically by hydraulic or electric motor
19 servomechanisms.

20 The cantilevered, Ferris wheel support arrangement
21 allows the inking/coating apparatus to operate effectively in the
22 interstation space between any adjacent printing units, as well as
23 on the first or last printing units of the press, without blocking
24 or obstructing the interstation space or restricting operator
25 access to the cylinders of any of the printing units.

26 Finally, because the inking/coating apparatus of the
27 present invention is mounted on a printing unit tower and is
28 extendable to the operative position without requiring adjustment
29 or alteration of the printing unit cylinders, it can be used for
30 applying ink or coating to the blanket cylinder of a rotary offset
31 web press, or to the blanket of a dedicated coating unit.

32 Although the present invention and its advantages have
33 been described in detail, it should be understood that various
34 changes, substitutions and alterations may be made herein without

- 1 departing from the spirit and scope of the present invention as
2 defined by the appended claims.

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What is claimed is:

1 1. In a printing press of the type having side frame
2 members forming a printing unit tower on which a plate cylinder
3 and blanket cylinder are supported for rotation, the improvement
4 comprising:

5 inking/coating apparatus for applying ink or
6 coating material to a plate mounted on the plate cylinder or to a
7 blanket mounted on the blanket cylinder when the inking/coating
8 apparatus is in an operative position; and,

9 a carriage assembly including a support arm having
10 a first end portion pivotally coupled to the printing unit tower
11 and a second end portion pivotally coupled to the inking/coating
12 apparatus, the carriage assembly being movable to an operative
13 position in which the inking/coating apparatus is suspended
14 laterally adjacent to the plate and blanket cylinders, and being
15 movable to a retracted position in which the inking/coating
16 apparatus is elevated with respect to the plate and blanket
17 cylinders.

1 2. The invention as set forth in claim 1, wherein the
2 inking/coating apparatus comprises:

3 a doctor blade assembly having a reservoir for
4 receiving ink or liquid coating material;

5 an applicator roller coupled to the doctor blade
6 assembly in fluid communication with the reservoir, the applicator
7 roller being engagable with a printing plate on the plate cylinder
8 or with a blanket on the blanket cylinder when the inking/coating
9 apparatus is in the operative position.

1 3. The invention as set forth in claim 2, the
2 applicator roller comprising:

3 an anilox roller having a resilient transfer
4 surface.

4. The invention as set forth in claim 1, including a counterweight coupled to the support arm.

1 5. The invention as set forth in claim 1, further
2 comprising:

3 a power actuator pivotally coupled to the support
4 arm, the power actuator having a power transfer arm which is
5 extendable and retractable; and,

6 apparatus coupled to the power transfer arm for
7 converting extension or retraction movement of the power transfer
8 arm into pivotal movement of the inking/coating apparatus relative
9 to the support arm.

1 6. The invention as set forth in claim 5, in which the
2 movement converting apparatus comprises:

3 a bell crank plate having a first end portion
4 coupled to the power transfer arm and having a second end portion
5 for engaging a stop member;

6 a stop member secured to the inking/coating
7 apparatus; and,

8 a clevis plate secured to the support arm and
9 pivotally coupled to the bell crank plate.

1 7. The invention as set forth in claim 1, the
2 inking/coating apparatus comprising:

3 an applicator head having first and second side
4 frame members pivotally coupled to the carriage assembly;

5 a doctor blade assembly mounted between the first
6 and second side frame members, the doctor blade assembly including
7 a reservoir for receiving ink or liquid coating material;

8 cradle means mounted on the first and second side
9 frame members, respectively;

10 an applicator roller mounted for rotation on the
11 cradle means and coupled to the doctor blade assembly for rolling
12 contact with ink or coating material in the reservoir, the

13 applicator roller being engagable with a printing plate on the
14 plate cylinder or with a blanket on the blanket cylinder in the
15 operative position; and,

16 motor means coupled to the applicator roller for
17 rotating the applicator roller.

1 8. The invention as set forth in claim 7,
2 the cradle means including first and second sockets
3 disposed on the first and second side frame members respectively;
4 and,

5 the applicator roller being mounted for rotation on
6 the first and second sockets.

1 9. The invention as set forth in claim 7,
2 the cradle means including first and second sockets
3 disposed on the first and second side frame members, respectively,
4 and third and fourth sockets disposed on the first and second side
5 frame members, respectively;

6 the applicator roller being mountable for rotation
7 on the first and second sockets for applying ink or coating
8 material to the plate when the carriage assembly is in the
9 operative position; and,

10 the applicator roller being mountable for rotation
11 on the third and fourth sockets for applying ink or coating
12 material to the blanket when the carriage assembly is in the
13 operative position.

1 10. The invention as set forth in claim 1, comprising:
2 male and female latch coupling members mounted on
3 the carriage assembly and on the printing unit tower, respective-
4 ly, for releasably latching the carriage assembly in interlocking
5 engagement with the printing unit tower in the operative position.

1 11. The invention as set forth in claim 1, wherein the
2 support arm comprises an elongated shank portion and a hub portion

3 which extends transversely with respect to the shank portion, the
4 elongated shank portion being pivotally coupled to the inking/coating apparatus and the hub portion being pivotally coupled
5 to the printing unit tower.

1 12. A sheet-fed, rotary offset printing press comprising,
2 in combination:

3 at least one printing unit or dedicated coating
4 unit having side frame members forming a tower;

5 at least one cylinder mounted for rotation on the
6 tower for printing ink or coating material onto sheets passing
7 through the printing unit or dedicated coating unit;

8 inking/coating apparatus including a doctor blade
9 assembly having a reservoir for holding ink or coating liquid, a
10 rotatable applicator roller and means for applying ink or coating
11 liquid from the reservoir onto a peripheral surface portion of the
12 applicator roller; and,

13 support apparatus mounted on the printing unit
14 tower for pivotal movement, said support apparatus being movably
15 coupled to the inking/coating apparatus for supporting the
16 inking/coating apparatus for movement to an operative position in
17 which the applicator roller is engagable with a plate or a blanket
18 on the cylinder, and for movement to a retracted position in which
19 the inking/coating apparatus is supported at an elevated position
20 above the cylinder.

1 13. A rotary offset printing press comprising, in
2 combination:

3 a plate cylinder having a printing plate mounted
4 thereon;

5 a blanket cylinder having an ink receptive blanket
6 disposed in ink transfer engagement with the plate cylinder for
7 transferring ink from the image surface areas of the printing
8 plate to the ink receptive blanket;

14 inking/coating apparatus for applying ink or
15 coating material to the plate or to the blanket;

support apparatus mounted on the printing press for pivotal movement, said support apparatus being movably coupled to the coating apparatus for supporting the inking/coating apparatus for movement to an operative position in which the inking/coating apparatus is engagable with the plate or the blanket, and for movement to a retracted position in which the inking/coating apparatus is supported at an elevated position above the press; and.

24 a dryer mounted on the press for discharging heated
25 air on the freshly printed substrate.

1 14. A rotary offset printing press as defined in claim
2 13, wherein:

the dryer is mounted adjacent the impression cylinder for discharging heated air onto a freshly printed substrate while the substrate is in contact with the impression cylinder.

1 15. A rotary offset printing press as defined in claim
2 13, comprising:

1 16. A rotary offset printing press as defined in claim
2 13, comprising:

TOP SECRET

3 a transfer cylinder disposed in an interstation
4 position on the press and coupled in sheet transfer relation with
5 the impression cylinder; and,

6 an interstation dryer disposed adjacent the
7 transfer cylinder for discharging heated air onto a freshly
8 printed or coated substrate after it has been transferred from the
9 impression cylinder and while it is in contact with the inter-
10 mediate transfer cylinder.

1 17. In a printing press of the type having side frame
2 members forming a tower on which a blanket cylinder is supported
3 for rotation, the improvement comprising:

4 inking/coating apparatus for applying ink or
5 coating material to a blanket mounted on the blanket cylinder when
6 the inking/coating apparatus is in an operative position; and,

7 a carriage assembly movably coupled to the tower
8 and to the inking/coating apparatus for producing Ferris wheel
9 movement of the inking/coating apparatus to the operative position
10 in which the inking/coating apparatus is suspended laterally
11 adjacent to the blanket cylinder, and to a retracted position in
12 which the inking/coating apparatus is elevated with respect to the
13 blanket cylinder.

1 18. The invention as set forth in claim 17, wherein the
2 tower includes a plate cylinder and a plate mounted on the plate
3 cylinder, the inking/coating apparatus including:

4 first cradle means for supporting an applicator
5 roller for engagement against the plate when the inking/coating
6 apparatus is in the operative position; and,

7 second cradle means for supporting an applicator
8 roller for engagement against the blanket when the inking/coating
9 apparatus is in the operative position.

1 19. The invention as set forth in claim 17, comprising:
2 said carriage assembly including a support arm
3 having a first end portion pivotally coupled to the tower and
4 having a second end portion;

5 a common pivot shaft on which the support arm
6 second end portion and the inking/coating apparatus are pivotally
7 mounted; and,

8 male and female latch members coupled between the
9 common pivot shaft and the tower, with one of the latch members
10 being secured to the common pivot shaft and the other latch member
11 being secured to the tower, the latch members being mateable in
12 interlocking engagement when the inking/coating apparatus is in
13 the operative position.

1 20. The invention as set forth in claim 17, further
2 comprising:

3 a power actuator pivotally coupled to the support
4 arm, the power actuator having a power transfer arm which is
5 extendable and retractable; and,

6 apparatus coupled to the power transfer arm for
7 converting extension or retraction movement of the power transfer
8 arm into pivotal movement of the inking/coating apparatus relative
9 to the common pivot shaft.

1 21. The invention as set forth in claim 20, in which
2 the movement converting apparatus comprises:

3 a bell crank plate having a first end portion
4 coupled to the power transfer arm and having a second end portion
5 for engaging a stop member;

6 a stop member secured to the inking/coating
7 apparatus; and,

8 a clevis plate secured to the support arm and
9 pivotally coupled to the bell crank plate.

1 22. The invention as set forth in claim 1, wherein the
2 inking/coating apparatus comprises:
3 an applicator roller having a resilient transfer
4 surface.

1 23. The invention as set forth in claim 1, wherein the
2 applicator roller is mounted for engagement to a plate in the
3 plate cylinder position, the applicator roller comprising an
4 anilox roller having a resilient transfer surface.

1 24. A method for rotary offset printing in a rotary
2 offset press of the type including first and second printing
3 units, and using aqueous or UV-curable printing ink or coating
4 material in the operation of at least the first printing unit,
5 comprising the following steps performed at each printing unit in
6 succession:

7 spot or overall coating with aqueous ink/aqueous
8 coating or UV-curable ink/UV-curable coating from the plate;

9 spot and/or overall coating the blanket with
10 aqueous ink/aqueous coating or UV-curable ink or UV-curable
11 coating from the blanket;

12 transferring the printing ink or coating from the
13 printing plate to the blanket;

14 transferring the printed image from the blanket to
15 a substrate as the substrate is transferred through the nip
16 between an impression cylinder and the blanket; and,

17 drying the ink or coating on the freshly printed
18 substrate before the substrate is processed in the second printing
19 unit.

1 25. A method for rotary offset printing as defined in
2 claim 24,

3 wherein the drying step is performed by discharging
4 hot air onto the freshly printed/coated substrate after it has
5 been transferred from the first printing unit and while it is

6 contact with an intermediate transfer cylinder, but before it is
7 processed in the second printing unit.

1 26. A method for rotary offset printing as defined in
2 claim 24,

3 wherein the drying step is performed by directing
4 high velocity, heated air onto the freshly printed/coated
5 substrate while the freshly printed/coated substrate is in contact
6 with an impression cylinder.

1 27. A method for rotary offset printing as defined in
2 claim 24, including the steps:

3 transferring the freshly printed substrate to an
4 intermediate transfer cylinder; and,

5 drying the freshly printed substrate while it is in
6 contact with the intermediate transfer cylinder.

1 28. A method for rotary offset printing as defined in
2 claim 24, including the step:

3 extracting hot air, moisture and volatiles from an
4 exposure zone above the freshly printed/coated substrate while the
5 freshly printed/coated substrate is in contact with the impression
6 cylinder.

1 29. A method for rotary offset printing as defined in
2 claim 24, including the steps:

3 applying a primer coating of an aqueous coating
4 material or UV-curable coating material to a substrate in the
5 first printing unit;

6 trapping and sealing dust, lint, spray powder and
7 other debris under the primer coating; and,

8 drying the primer coating on the substrate before
9 the substrate is overprinted in the second printing unit.

1 30. A method for rotary offset printing in a rotary
2 offset press of the type including first and second printing
3 units, and using aqueous or UV-curable printing ink/coating
4 material in the operation of at least the first printing unit
5 comprising the following steps performed at each printing unit in
6 succession:

7 transferring the printing ink/coating material to
8 a printing plate at the first printing unit;

9 transferring the printing ink/coating material from
10 the printing plate to a blanket;

11 transferring the printed image from the blanket to
12 a substrate as the substrate is transferred through the nip
13 between an impression cylinder and the blanket; and,

14 drying the printing ink on the freshly printed
15 substrate before the substrate is processed in the second printing
16 unit.

1 31. A method for rotary offset printing as defined in
2 claim 30,

3 wherein the drying step is performed by discharging
4 hot air onto the freshly printed substrate after it has been
5 transferred from the first printing unit and while it is in
6 contact with an intermediate transfer cylinder, but before it is
7 processed in the second printing unit.

1 32. A method for rotary offset printing as defined in
2 claim 30, wherein the drying step is performed by directing high
3 velocity, heated air onto the freshly printed substrate while the
4 freshly printed substrate is in contact with the impression
5 cylinder.

1 33. A method for rotary offset printing as defined in
2 claim 30, including the steps:

3 transferring the freshly printed substrate to an
4 intermediate transfer cylinder; and,

5 drying the freshly printed substrate while it is in
6 contact with the intermediate transfer cylinder.

1 34. A method for rotary offset printing as defined in
2 claim 30, including the step:

3 extracting hot air, moisture and volatiles from an
4 exposure zone above the substrate while the substrate is in
5 contact with the impression cylinder.

"RETRACTABLE INKING/COATING APPARATUS
HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS"

Abstract of the Disclosure

1 A retractable in-line inking/coating apparatus selec-
2 tively applies either spot or overall ink/coating to a blanket or
3 flexographic plate on a blanket cylinder or spot coating or
4 overall ink/coating to a flexographic printing plate on a plate
5 cylinder in a rotary offset printing press. The inking/coating
6 apparatus is pivotally mounted on the tower of a printing unit or
7 dedicated coating unit, and is extended into and retracted out of
8 inking/coating engagement by a carriage assembly which is
9 pivotally coupled to the printing unit tower. Because of the
10 pivotal support provided by a cantilevered support arm, the
11 inking/coating apparatus can be raised and lowered through a
12 Ferris wheel arc movement between adjacent printing units. The
13 aqueous component of the printing ink or coating is evaporated by
14 a high velocity, hot air interstation dryer and a high performance
15 heat and moisture extractor so that the ink on a freshly printed
16 sheet is dry before the sheet is printed on the next printing
17 unit. Thus, flexographic ink or coating applied at the first
18 printing unit can immediately be overprinted on subsequent
19 printing units.

* * * * *

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PATENT

JOINT
UTILITY

Attorney Docket
No. B6012

DECLARATION AND POWER OF ATTORNEY

We, RONALD M. RENDLEMAN, HOWARD W. DEMOORE, JOHN W. BIRD, joint inventors herein, hereby declare that:

Our residence, post office address and citizenship are as stated below next to our names.

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled

"RETRACTABLE INKING/COATING APPARATUS HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS",

the specification of which is attached hereto.

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to in this declaration.

We each individually acknowledge the duty to disclose to the U.S. Patent Office all information known to me that is material to the patentability of any claim in accordance with Title 37, Code of Federal Regulations, §1.56, and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent.

We hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Country</u>	<u>Application No.</u>	<u>Filing Date (day, month, year)</u>
----------------	------------------------	---

- NONE -

We hereby claim the benefit under Title 35, United

-1-

States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>U.S. Serial No.</u>	<u>U.S. Filing Date</u>	<u>Status</u>
------------------------	-------------------------	---------------

- NONE -

We hereby appoint DENNIS T. GRIGGS, Registration No. 27,790, of the firm of AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P., our attorney to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith. We request that all correspondence be addressed to:

Dennis T. Griggs
Akin, Gump, Strauss, Hauer & Feld, L.L.P.
1700 Pacific Avenue, Suite 4100
Dallas, Texas 75201-4618

Phone: 214/969-2747

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Full name of
first joint Inventor: Ronald M. Rendleman /-oo

Residence: Dallas, Texas TX

Citizenship: U.S.

Post Office Address: 4331 Royal Ridge
Dallas, Texas 75229

Date: 5/1/95

Ronald M. Rendleman

Quinn →

Full name of
second joint Inventor: Howard W. DeMoore 2-cc

Residence: Dallas, Texas

Citizenship: U.S. TX

Post Office Address: 10954 Shady Trail
Dallas, Texas 75220

Date: May 1, 1995

Howard DeMoore
Howard W. DeMoore

Full name of
third joint Inventor: John W. Bird 3-cc

Residence: Carrollton, Texas

Citizenship: U.S. TX

Post Office Address: 1514 Iroquois Circle
Carrollton, Texas 75007

Date: May 1, 1995

John Bird
John W. Bird

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SMALL ENTITY
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, RONALD M. RENDLEMAN, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS"

in the application filed herewith.

in U.S. application Serial No. _____ filed _____.

patent No. _____, issued _____.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

no such person, concern or organization exists.

any such person, concern or organization is identified below, if applicable:

P0017660 040425748660

Full Name Howard W. DeMoore
Address 10954 Shady Trail
Dallas, Texas 75220

individual small business concern
 nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: Ronald M. Rendleman

Date: 5/1/95


Signature of Inventor

SMALL ENTITY
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, HOWARD W. DEMOORE, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS"

in the application filed herewith.

in U.S. application Serial No. _____ filed _____.

patent No. _____, issued _____.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

no such person, concern or organization exists.

any such person, concern or organization is identified below, if applicable:

Full Name Printing Research, Inc.
Address 10954 Shady Trail
Dallas, Texas 75220

individual small business concern
 nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: Howard W. DeMoore

Date: May, 1990 Howard W. DeMoore
Signature of Inventor

SMALL ENTITY
INDEPENDENT INVENTOR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECLARATION CLAIMING SMALL ENTITY STATUS
(37 C.F.R. §1.9(f) and §1.27 (b)) - INDEPENDENT INVENTOR

I, JOHN W. BIRD, hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. §1.9(c) for the purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the U.S. Patent and Trademark Office with regard to the invention entitled

"RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS"

- in the application filed herewith.
 in U.S. application Serial No. _____ filed
 patent No. _____, issued _____.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. §1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a non-profit organization under 37 C.F.R. §1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under any obligation under contract or law to assign, grant, convey, or license any rights in the invention is identified below:

- no such person, concern or organization exists.
 any such person, concern or organization is identified below, if applicable:

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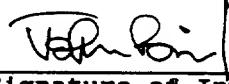
Full Name Howard W. DeMoore
Address 10954 Shady Trail
Dallas, Texas 75220

individual small business concern
 nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate pursuant to 37 C.F.R. §1.28(b).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Printed Name of Inventor: John W. Bird

Date: May 1, 1995 
Signature of Inventor

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SMALL ENTITY
SMALL BUSINESS CONCERNIN THE UNITED STATES PATENT AND TRADEMARK OFFICE
VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL
ENTITY STATUS (37 C.F.R. §1.9(f) and §1.27(c))—
SMALL BUSINESS CONCERNI, HOWARD W. DEMOORE

hereby declare that I am

- the owner of the small business concern identified below:
- an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Printing Research, Inc.
ADDRESS OF CONCERN 10954 Shady Trail
Dallas, Texas 75220

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 37 C.F.R. §121.3-18, and reproduced in 37 C.F.R. §1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when, either directly or indirectly, one concern controls or has the power to control the other, or a third-party controls or has the power to control both.

I hereby declare that rights under license, contract or law have been acquired by or conveyed to and remain with the small business concern identified above with regard to the invention entitled

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"RETRACTABLE INKING/COATING APPARATUS HAVING
FERRIS MOVEMENT BETWEEN PRINTING UNITS"

by inventors Ronald M. Rendleman, Howard W. DeMoore and
John W. Bird

as described in

- the specification filed herewith.
 the specification filed _____ under Serial
No. _____.
 Patent No. _____, issued _____.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 C.F.R. §1.9(d) or by any concern which would not qualify as a small business concern under 37 C.F.R. §1.9(d) or a nonprofit organization under 37 C.F.R. §1.9(e).

- no such person, concern or organization exists
 any such person, concern or organization is identified below, if applicable:

Full Name _____

Address _____

_____ individual _____ small business concern
_____ nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small business entity is no longer appropriate. (37 C.F.R. §1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or

imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

TYPED NAME OF PERSON SIGNING Howard W. DeMoore

TITLE OF PERSON OTHER THAN OWNER President and Chairman of
the Board

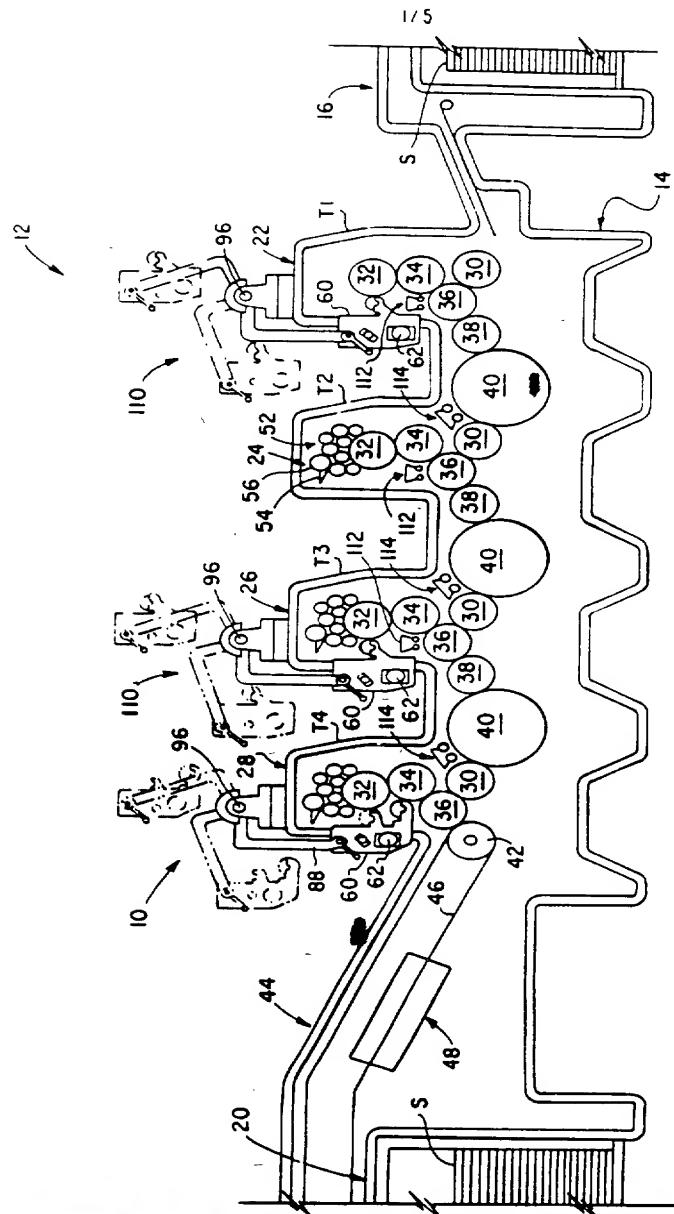
Date: May 1, 1975

Howard W. DeMoore
Signature

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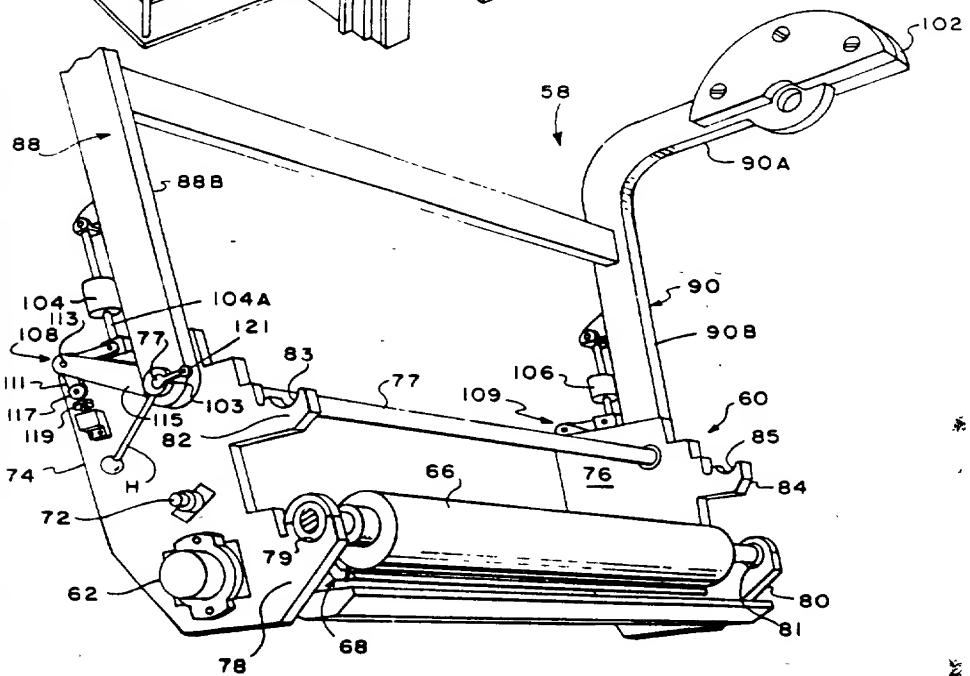
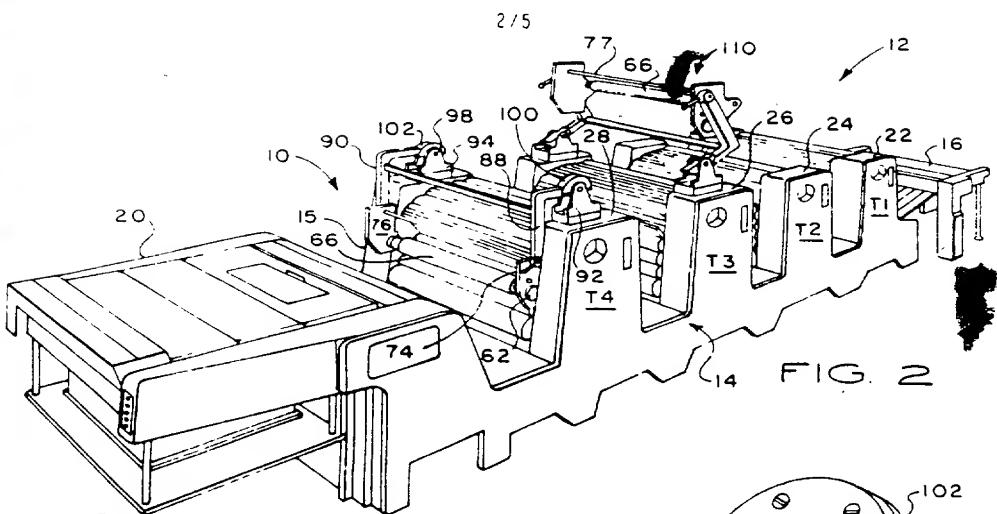
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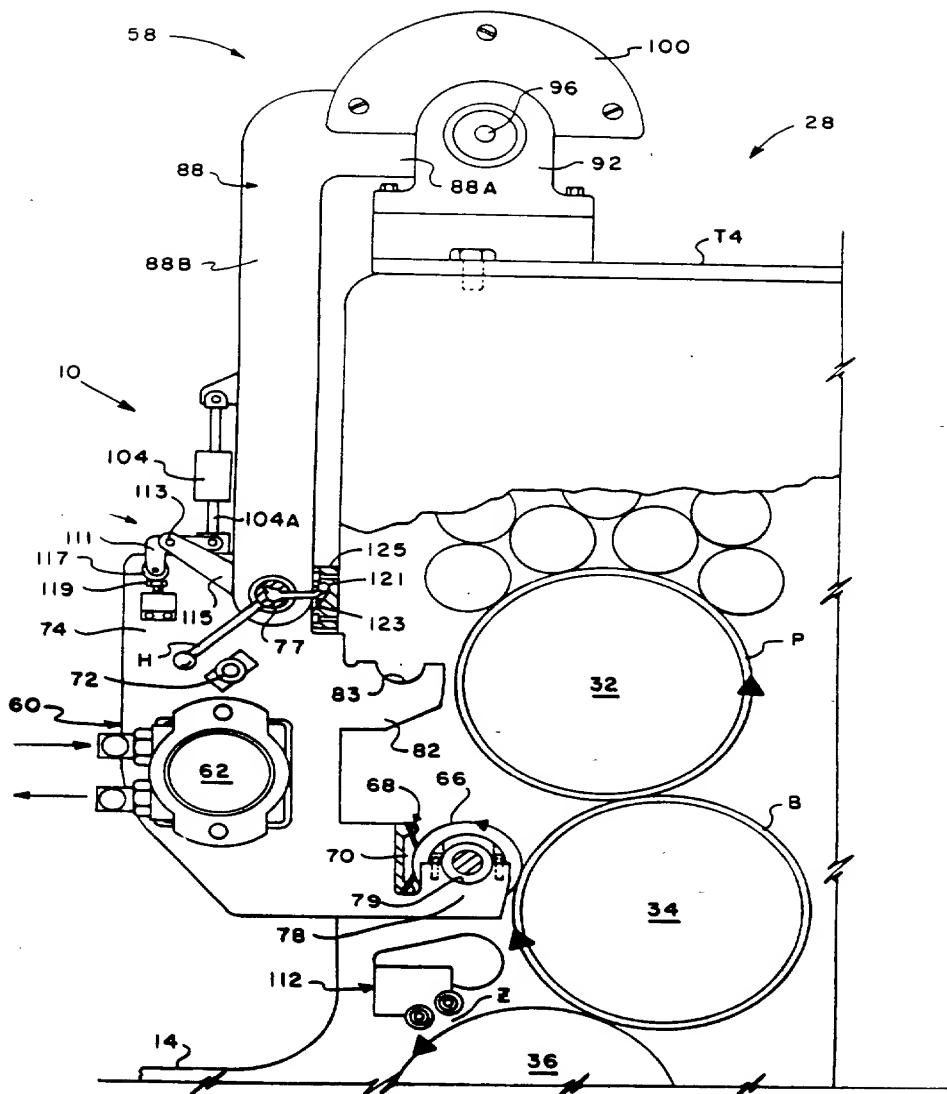
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JOHN W BIRD

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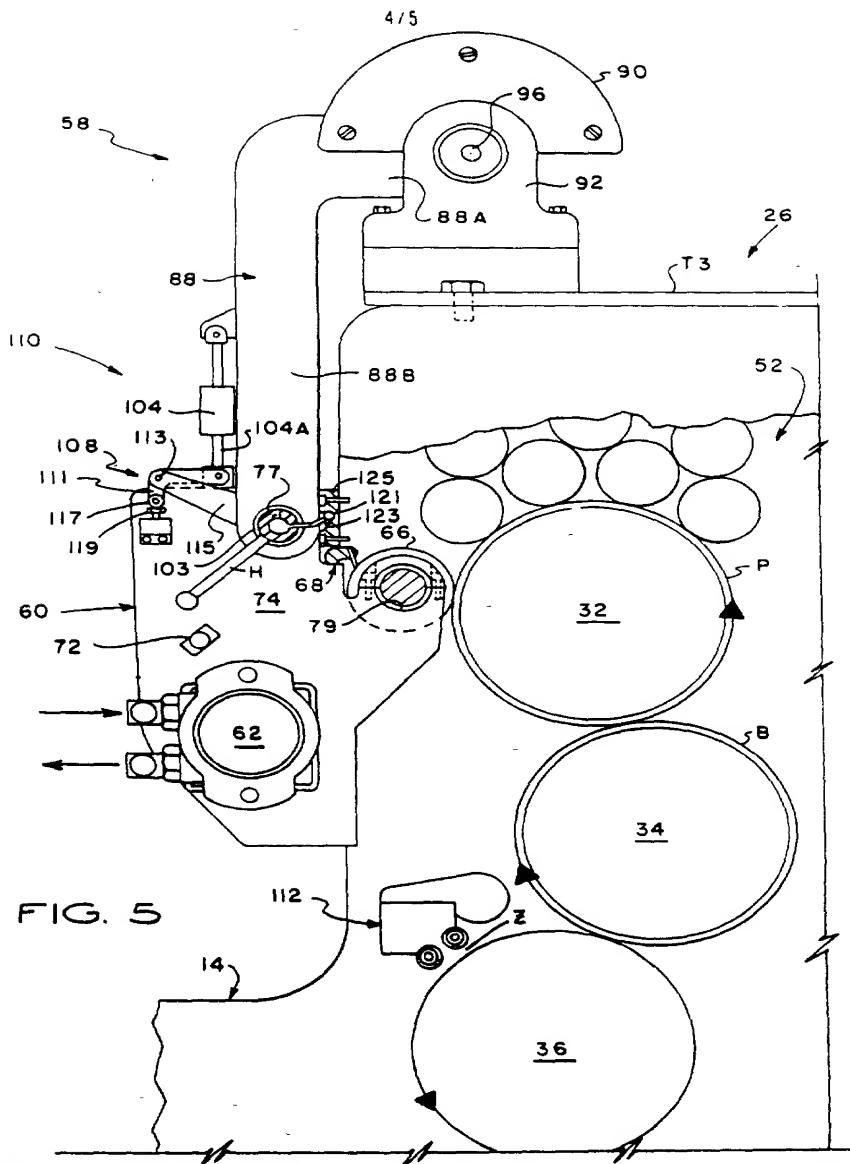


FIG. 5

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*THIS IS TO CERTIFY that page (s) fig.-6 is
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K. White
Certifying Officer

5/6/96
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COPY

Datum/Date
15.04.97

Zeichen/Ref /Réf HAG/FP5233994	Anmeldung Nr /Application No /Demande n° //Patent Nr /Patent No /Brevet n° 96303136.4
Anmelder/Applicant/Demandeur//Patentinhaber/Proprietor/Titulaire DeMoore, Howard W.	

COMMUNICATION

The European Patent Office herewith transmits

- the European search report
- the declaration under Rule 45 EPC
- the partial European search report under Rule 45 EPC
- the supplementary European search report concerning the international application under Article 157(2) EPC relating to the above-mentioned European patent application. Copies of the documents cited in the search report are enclosed.

The following specifications given by the applicant have been approved by the Search Division :

Abstract

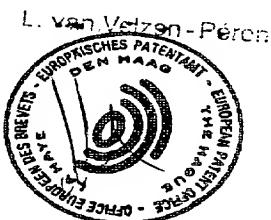
Title

Figure

- The abstract was modified by the Search Division and the definitive text is attached to this communication.
- The following figure will be published with the abstract, since the Search Division considers that it better characterises the invention than the one indicated by the applicant.

Figure:

Additional copy(copies) of the documents cited in the European search report.



REFUND OF THE SEARCH FEE

If applicable under Article 10 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.

EPO Form 1507 02.93



DOCUMENTS CONSIDERED TO BE RELEVANT																		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)															
X	US 4 841 903 A (BIRD)	1,15-17	B41F31/30															
Y	* abstract; claims; figure 1 *	4-6,8,9, 13	B41F5/24 B41F23/08															
X	US 5 107 790 A (SLIKER ET AL.) * abstract; claim 1; figures * * column 2, line 9 - line 22 *	---	1,18															
Y	US 5 335 596 A (DEMOORE ET AL.) * abstract; figures 1-4 * * column 7, line 32 - line 58 *	---	4,5,8,9															
Y	US 4 617 865 A (SWITALL) * abstract; figures 1-3 * * column 6, line 9 - line 42 *	---	6															
Y	US 4 825 804 A (DIRICO ET AL.) * abstract; figures 2,3 * * column 3, line 10 - line 21 *	---	13															
A	EP 0 647 524 A (DEMOORE) * abstract; figures 1,2,5 * * column 4, line 32 - line 40 *	---	15-22															
A	PAPIER + KUNSTSTOFF VERARBEITER, vol. 26, no. 6, 1 June 1991, page 129 XP000232825 "LACKIER-AGGREGAT FUER SPEEDMASTER-MASCHINEN"	-----	B41F															
<p>The present search report has been drawn up for all claims</p> <hr/> <p>1</p> <table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>20 March 1997</td> <td>Helpiö, T</td> </tr> <tr> <td colspan="3"> CATEGORY OF CITED DOCUMENTS </td> </tr> <tr> <td colspan="3"> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document </td> </tr> <tr> <td colspan="3"> T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document </td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	20 March 1997	Helpiö, T	CATEGORY OF CITED DOCUMENTS			X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		
Place of search	Date of completion of the search	Examiner																
THE HAGUE	20 March 1997	Helpiö, T																
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T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document																		

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 96 30 3136

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-03-1997

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 4841903 A	27-06-89	US 4939992 A		10-07-90
US 5107790 A	28-04-92	NONE		
US 5335596 A	09-08-94	US 5176077 A US 5207159 A AT 148038 T AU 646197 B CA 2094694 A CN 1079689 A,B CZ 9300826 A DE 69307599 D EP 0574124 A JP 7178361 A KR 9612753 B		05-01-93 04-05-93 15-02-97 10-02-94 07-11-93 22-12-93 19-01-94 06-03-97 15-12-93 18-07-95 24-09-96
US 4617865 A	21-10-86	NONE		
US 4825804 A	02-05-89	JP 1045638 A		20-02-89
EP 647524 A	12-04-95	AU 675549 B AU 6895394 A BR 9403940 A CA 2129321 A CN 1109004 A CZ 9402450 A FI 944278 A JP 7164617 A NO 943706 A		06-02-97 04-05-95 13-06-95 07-04-95 27-09-95 14-06-95 07-04-95 27-06-95 07-04-95



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Telephone Numbers:

Primary Examiner (substantive examination) (089) 2399-2793

Formalities Officer / Assistant (Formalities and other matters) (089) 2399-2606



Application No 96 303 136.4-2304	Ref. HAG/FP5233994	Date 06.10.98
Applicant DeMoore, Howard W.		

Communication pursuant to Article 96(2) and Rule 51(2) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months

from the notification of this communication, this period being computed in accordance with Rules 78(3) and 83(2) and (4) EPC.

Amendments to the description, claims and drawings are to be filed where appropriate within the said period in **three copies** on separate sheets (Rule 36(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).



SARTOR M
Primary Examiner
for the Examining Division

EXRE coded

Enclosure(s): 2 page/s reasons (Form 2906)

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06. 10. 98

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Date
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Feuille

1

Anmelde-Nr.:
Application No.:
Demande n°:

96 303 136.4

The examination is being carried out on the **following application documents:**

Text for the Contracting States:

DE FR GB IT SE

Description, pages:

1-23 as originally filed

Claims, No.:

1-22 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

1.1 Claim 1 in its present form can be read over US-A-5 107 790 (see col. 3, lines 41-42, col. 5, lines 35-47, Fig.1) lacking therefore novelty (Art. 54 (1) (2) EPC). It is clear from the description on pages 2 and 3 that the following features, not comprised in claim 1 in its present form, are essential to the performance of the invention:

(1) "...the carriage assembly comprising a support arm having a first end portion constructed for pivotal attachment to the printing unit and a second end portion pivotally coupled to the applicator head, the applicator head being movable on the support arm between an operative position laterally adjacent to the plate and blanket cylinders and an elevated, retracted position in which the applicator head is elevated with respect to said plate and blanket cylinders..",

(2) "...a doctor blade assembly having a reservoir for receiving ink or liquid coating material.." and

(3) "...an applicator roller coupled to the doctor blade assembly in fluid

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Anmelde-Nr.:
Application No.:
Demande n°

96 303 136.4

communication with the reservoir, the applicator roller being engageable with a printing plate on the plate cylinder or with a blanket on the blanket cylinder when the applicator head is in the operative position."

Since independent claim 1 does not contain these features it does not meet the requirement following from Article 84 taken in combination with Rules 29(1) and (3) EPC that any independent claim must contain all the technical features essential to the invention.

In order to overcome the abovementioned objections a new claim 1 should therefore be filed, said claim containing the abovementioned features (1)-(3).

- 1.2 The same objections raised on point 1.1 apply also to the subject-matter of independent claim 15.
3. To meet the requirements of Rule 27(1)(b) EPC, the document US-A-5 107 790 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

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D J Price
D J Rainsford
D J Tinsley
D J Wren
D J Williams
D J Young

8 February 1999

Dear Sirs

European Patent Application No. 96303136.4-2304

Howard W DeMoore
Our Ref: HAG/FP5233994

We regret we are not yet able to file a response to the outstanding official letter of 6 October 1998.

We would therefore request a two-month extension of time for this purpose.

Yours faithfully

H A Gura
AUTORISED REPRESENTATIVE

HAG/KA

16.02.99 S

Offices also at
Manchester



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Datum/Date

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Zeichen/Ref./Réf. HAG/FP5233994	Anmeldung Nr /Application No./Demande n° /Patent Nr /Patent No /Brevet n° 96303136.4-2304/
Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire DeMoore, Howard W.	

EXTENSION OF TIME LIMIT PURSUANT TO RULE 84 EPC

Examination procedure

With reference to your request dated , the time limit for replying to the communication dated 06.10.98 has been extended

by months

to a total of months,

from the date of notification of the above-mentioned communication.

[] Please note: To the extent that your request exceeded the above extension, your request has been refused.

Note:

The granting of extensions to time limits is governed by the implementing Regulations to the EPC and the Guidelines for Examination in the EPO, part E-VIII, 1.6.

If no reply to the communication is received in due time, the European patent application will be deemed to be withdrawn (Article 96(3) EPC).

For the Examining Division:

Tel. No.: (+49-89) 2399-8734

M. Slegan

EPO Form 2944A 04.97				7053035 16/02/99

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and CPA in CPD

16 April 1999

BY FACSIMILE

Dear Sirs

European Patent Application No. 96303136.4-2304
Howard W DeMoore
Our Ref: HAG/FP5233994

We are writing in reply to the official letter of 6 October 1998 and file herewith replacement copies of new pages 2, 3, 3a, 3b, 4 and 24-33 in triplicate for pages 2-4 and 24-33.

Claim 1 has been amended to distinguish it further from US 5,107,790 and, having regard to the Examiner's comments, to include a reference to the supply system for the ink or coating to be applied. However, we cannot agree with the Examiner that the disclosure in the specification requires that the claims should refer to those additional features set out in his comments. In particular, we dispute that the description on original pages 2 and 3 supports his contention.

In any case, it is necessary to look at the disclosure as a whole and it is clear that the claim as now amended has ample support in the application as filed. Specifically, the reference now in claim 1 to the ink or coating supply is sufficient for compliance with the requirements for support. It is not justifiable to require the applicant to limit his claim by including arbitrary elements of a preferred embodiment.

With regard to claim 15, it should be noted that this is not an independent claim as it refers to the inking/coating apparatus of the preceding claims. It thus imports all the features of claim 1 and requires no further particularisation.

The Examiner will note that we have taken the opportunity to make a number of formal changes in the claims, including the addition of multiple dependencies. There are also a few minor clerical errors to be corrected in the description, which the Examiner may find more convenient to undertake himself, namely:

contd/ ...

Offices also at Bristol Cambridge
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2

- page 8, line 21 correct "areas"
page 12, line 2 delete "used"
 line 14 replace "86" with "58"

We believe the present amendments deal fully with the objections raised and thus place the application in order for allowance. As a formal matter, however we ask that if the intention should be formed to refuse the application we be given the opportunity for a hearing before any formal notice of rejection is issued.

Yours faithfully



H A Gura
AUTHORISED REPRESENTATIVE

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line coating is performed, the last printing unit cannot be used to apply ink to the sheets, and can only be used for the coating operation. Thus, while coating with these types of in-line coating apparatus, the press loses the 5 capability of printing its full range of colors since the last printing unit is converted to a coating unit.

It will be appreciated that the time required to reconfigure a press for coating or non-coating is non-productive and costly. Accordingly, there is a need for an 10 in-line coating apparatus that minimizes the time to clean-up from one printing run and set-up and run the next job. Where consecutive jobs require the same type of coating, particularly blanket coating, it may not be necessary to clean-up the coater between jobs. However, the coating 15 material cannot be allowed to dry on the rollers. Therefore, especially when switching from blanket to spot coating or vice versa, or if there is a delay between jobs, it is necessary to wash-up the coater after each job is completed.

20 In addition, coater wash-up is necessary when switching between different coating compositions, such as aqueous and ultra violet (UV) curable coatings. Such coating materials are not interchangeable, and consequently, the coater must be washed between applications of 25 different coating media.

P00150-38297668

US 5,107,790 describes a two headed coater in which a spot coater assembly is disposed on one side of a plate cylinder and blanket cylinder pair and a blanket coating assembly is disposed on the other side of the cylinder pair. Each of the coating assemblies is slidable longitudinally away from the cylinder pair, in opposite directions, and the blanket coating assembly is also slidably displaceable along an inclined ramp, further away from the cylinder pair, these displacements being arranged to give access to each coating assembly. Such an arrangement requires a great deal of space and its usefulness is thus limited.

According to the present invention an inking/coating apparatus is provided for use in a printing press of the type having a printing unit on which a plate cylinder, a blanket cylinder and an impression cylinder are mounted for rotation, the apparatus comprising an applicator head for applying ink or coating materials to a plate mounted on the plate cylinder or to a blanket mounted on the blanket cylinder when the inking/coating apparatus is in the operative position relative to the plate and blanket cylinders, an applicator roller mounted in an applicator head being coupled with an ink or coating supply apparatus which provides a film of ink or coating on the applicator roll that can be transferred to said plate or blanket by movement of the applicator head being operative position, the applicator head to be pivotally mounted on a carriage assembly for movement to the operative position in

3a

which the applicator head is disposed laterally adjacent to the plate and blanket cylinders, and for movement to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

5 The carriage assembly may comprise a support arm which is preferably mounted on the printing press to be pivotally coupled between the inking/coating head and a printing unit tower of the press. The inking/coating unit can then be arranged to make a pivotal, Ferris wheel movement between the operative position and a retracted, overhead idle position. This cantilevered pivotal mounting arrangement can facilitate the use of the inking/coating head between two printing units as well as on the last printing unit of the press.

10 15 In a preferred embodiment, the applicator head includes vertically spaced pairs of cradle members with one cradle pair being adapted for supporting a metal or ceramic coating roller in alignment with a blanket cylinder, and the other cradle pair supporting a resilient anilox coating roller in alignment with the plate cylinder, respectively, when the carriage assembly is in the operative position. Because of the cantilevered, pivotal support provided by the support arm, the applicator head can be lifted and lowered through an arc, similar to Ferris wheel movement, in the limited space between adjacent printing units. When 20 25 fully retracted, the applicator head and carriage assembly are lifted to an elevated, retracted overhead position, preferably an overhead position overlying the printing unit

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tower, thus providing complete access to the interstation space and the printing unit cylinders without causing the printing unit to lose its printing capability. The

REF ID: A6472

inking/coating applicator roller of the applicator head can be inspected, cleaned or replaced and the doctor blade assembly can be washed-up automatically while the inking/coating apparatus is in the retracted position.

5 When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous ink or aqueous coating, it is preferred to arrange that the water component of the aqueous ink or coating on the freshly printed sheet is evaporated by a high velocity, hot air interstation dryer and a high
10 volume heat and moisture extractor assembly so that the freshly printed ink or coating is completely dry before the sheet is printed on the next printing unit. This quick drying flexographic printing/coating arrangement permits a base coat of ink, for example opaque white or metallic ink
15 (gold, silver or other metallics) to be applied in the first printing unit, and then overprinted by a lithographic process on the next printing unit.

Exemplary embodiments of the present invention are illustrated in the drawing figures wherein:

20 FIGURE 1 is a schematic side elevational view of a sheet-fed, rotary offset printing press having inking/coating apparatus embodying the present invention;

25 FIGURE 2 is a perspective view of the printing press of FIGURE 1 in which a dual head inking/coating apparatus is in the operative coating position and a single head coater is in a retracted, overhead position;

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CLAIMS

1. Inking/coating apparatus (10) for use in a printing press (12) of the type having a printing unit (22,24,26,28) on which a plate cylinder (32), a blanket cylinder (34) and an impression cylinder (36) are mounted for rotation,
5 wherein the inking/coating apparatus comprises:

an applicator head (60) for applying ink or coating materials to a plate (P) mounted on the plate cylinder or to a blanket (B) mounted on the blanket cylinder, when the
10 inking/coating apparatus is in the operative position relative to the plate and blanket cylinders,

an applicator roller (66) mounted in applicator head (60) being coupled with an ink or coating supply apparatus (68) which provides a film of ink or coating on the applicator roller that can be transferred to said plate or blanket by movement of the applicator head to the
15 operative position; and is characterised by

the applicator head (60) being pivotally mounted on a carriage assembly (58) for movement to the operative position in which the applicator head is disposed laterally adjacent to the plate and blanket cylinders and for movement to a retracted position in which the applicator head is elevated with respect to the plate and blanket
20 cylinders.

25 2. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) comprises:

a support arm (88, 90) having a first end portion (88A) constructed for pivotal attachment to the printing unit and having a second end portion (88B) pivotally coupled to the applicator head (60), the applicator head being movable on the support arm to the operative position.

3. Inking/coating apparatus (10) as set forth in claim 1 or claim 2, wherein a counterweight (100,102) is coupled to the carriage assembly.

4. Inking/coating apparatus (10) as set forth in any
10 one of claims 1 to 3, wherein the applicator head (60)
comprises:

a doctor blade assembly (68) having a reservoir (70) for receiving ink or liquid coating material; and,

the applicator roller (66) being coupled to the doctor blade assembly in fluid communication with the reservoir.

5. Inking/coating apparatus (10) as set forth in claim
4, wherein the applicator roller (66) is an anilox roller
having a resilient transfer surface.

-26-

6. Inking/coating apparatus (10) as set forth
in any one of claims 1 to 5, wherein:

a power actuator (104, 106) is movably coupled to the applicator head (60), the power actuator having a power transfer arm (104A, 106A) which is extendable and retractable; and,

movement converting apparatus (108) is coupled to the power transfer arm for converting extension or retraction movement of the power transfer arm into pivotal movement of the applicator head (60) relative to the carriage assembly.

7. Inking/coating apparatus (10) as set forth in claim 6, wherein the movement converting apparatus (108) comprises:

15 a bell crank plate (111) having a first end portion coupled to the power transfer arm and having a second end portion for engaging a stop member;

a stop member (119) secured to the applicator head (60); and,

20 a clevis plate (115) secured to the carriage assembly (58) and pivotally coupled to the bell crank plate.

8. Inking/coating apparatus (10) as set forth in any one of claims 1 to 3, wherein the applicator head (60) comprises:

- first and second side frame members (74, 76) pivotally coupled to the carriage assembly (58);
- a doctor blade assembly mounted on the first and second side frame members, the doctor blade assembly including a reservoir (70) for receiving ink or liquid coating material;
- a cradle assembly (78, 80), (82, 84) mounted on the first and second side frame members, respectively; the applicator roller (66) being mounted for rotation on the cradle assembly and coupled to the doctor blade assembly for rolling contact with ink or coating material in the reservoir; and
- 10
15
a drive motor (62) coupled to the applicator roller for rotating the applicator roller.
9. Inking/coating apparatus (10) as set forth in claim 8, wherein:
- 20
25
the cradle assembly (79, 80) has first and second sockets (79, 81) disposed on the first and second side frame members respectively; and,
the applicator roller (66) is mounted for rotation on the first and second sockets.
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-28-

10. Inking/coating apparatus (10) as set forth
in claim 8, wherein:

the cradle assembly (78, 80), (82, 84)
includes first and second sockets (79, 81) disposed on the
5 first and second side frame members, respectively, and
third and fourth sockets disposed on the first and second
side frame members, respectively; and,

10 the applicator roller (66) is selectively
mountable for rotation on either the first and second
sockets or on the third and fourth sockets for applying ink
or coating material to either the plate or blanket when the
applicator head is in the operative position.

15 11. Inking/coating apparatus (10) as set forth
in any one of claims 1 to 7, wherein the applicator head (60) comprises:

20 a first cradle (78, 80) for supporting an
applicator roller (66) for engagement with the plate when
the inking/coating apparatus is in the operative position;
and

25 a second cradle (82, 84) for supporting an
applicator roller (66) for engagement with the blanket (B)
when the inking/coating apparatus is in the operative
position.

12. Inking/coating apparatus (10) as set forth
25 in claim 1, wherein the carriage assembly comprises:

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-29-

a support arm (88, 90) having a first end portion pivotally coupled to the printing unit (88A, 90A) and having a second end portion (88B, 90B);

5 support arm second end portion and the inking/coating apparatus are pivotally mounted; and,

10 male and female latch members (103, 105) coupled between the common pivot shaft and the printing unit, with one of the latch members being secured to the common pivot shaft and the other latch member being constructed for attachment onto the printing unit, the latch members being mateable in interlocking engagement when the applicator head (60) is in the operative position.

13. Inking/coating apparatus (10) as set forth
15 in any one of the preceding claims, wherein the applicator head (60) and the printing unit comprise:

male and female latch coupling members (103,
105) mounted on the carriage assembly (58) and on the printing unit for releasably latching the carriage assembly
20 in interlocking engagement with the printing unit when the applicator head is in the operative position.

14. Inking/coating apparatus (10) as set forth
in claim 1, wherein the carriage assembly (58) comprises
an elongated shank portion (88B, 90B) and a hub
25 portion (88A, 90A), the elongated shank portion being pivotally coupled to the applicator head (60) and the hub

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portion being constructed for pivotal attachment onto the printing unit.

15. A rotary offset printing press (12) having first and second printing units (22, 24) and the inking/ccoating apparatus (10) of any one of the preceding claims movably coupled to the first printing unit (22) as set forth in claim 1, wherein:

10 a dryer (112) mounted on the first printing unit adjacent the impression cylinder (36) of the first printing unit for discharging heated air onto a freshly printed substrate while the freshly printed substrate is in contact with said impression cylinder.

15. A rotary offset printing press (12) as defined in claim 15, comprising:

15 an extractor (112E) is disposed adjacent the dryer for extracting hot air, moisture and volatiles from an exposure zone (Z) between the dryer and the freshly printed substrate.

20 17. A rotary offset printing press (12) as defined in claim 15 or claim 16, comprising

an intermediate transfer cylinder (40) is coupled in sheet transfer relation with the impression cylinder (36) of the first printing unit (22); and,

25 an interstation dryer (114) is disposed adjacent the intermediate transfer cylinder for discharging

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heated air onto a freshly printed or coated substrate after it has been transferred from the impression cylinder of the first printing unit and while it is in contact with the intermediate transfer cylinder (40).

5 18. A method for rotary offset printing in a printing press (12) of the type including first and second rotary offset printing units (22, 24), and using aqueous or UV-curable printing ink or coating material in the operation of at least the first printing unit, characterized by
10 the following steps performed at each printing unit in succession:

 spot or overall coating a plate (P) with aqueous ink/aqueous coating material or UV-curable ink/UV-curable coating material;

15 spot and/or overall coating a blanket (B) with aqueous ink/aqueous coating material or UV-curable ink or UV-curable coating material;

 transferring the printing ink or coating material from the printing plate (P) to the blanket (B);

20 transferring the inked or coated image from the blanket to a substrate (S) as the substrate is transferred through the nip between the impression cylinder (36) and the blanket (B); and,

25 drying the ink or coating material on the freshly printed substrate before the substrate is subsequently processed.

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-32-

19. A method for rotary offset printing as defined in claim 18, wherein the drying step comprises:

discharging high velocity, heated air onto
5 the freshly printed/coated substrate (S) while the freshly printed/coated substrate is in contact with the impression cylinder (36) of the first printing unit (22).

20. A method for rotary offset printing as defined in claim 18 further comprising:

10 transferring the freshly printed substrate (S) from the first printing unit (22) to an intermediate transfer cylinder (40); and,

drying the freshly printed substrate while it is in contact with the intermediate transfer cylinder.

15 21. A method for rotary offset printing as defined in claim 18 or claim 19, further comprising:

extracting hot air, moisture and volatiles from an exposure zone (Z) above the freshly printed/coated substrate (S) while the freshly printed/coated substrate is
20 in contact with the impression cylinder (36).

22. A method for rotary offset printing as defined in any one of claims 18 to 21, further comprising:

applying a primer coating of an aqueous coating material or UV-curable coating material to a
25 substrate (S) in the first printing unit (22); and,

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drying the primer coating on the substrate
before the substrate is processed in the second printing
unit.

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16 April 1999

CONFIRMATION BY FACSIMILE

Dear Sirs

European Patent Application No. 96303136.4-2304
Howard W DeMoore
Our Ref: HAG/FPS233994

We are writing in reply to the official letter of 6 October 1998 and file herewith replacement copies of new pages 2, 3, 3a, 3b, 4 and 24-33 in triplicate for pages 2-4 and 24-33.

Claim 1 has been amended to distinguish it further from US 5,107,790 and, having regard to the Examiner's comments, to include a reference to the supply system for the ink or coating to be applied. However, we cannot agree with the Examiner that the disclosure in the specification requires that the claims should refer to those additional features set out in his comments. In particular, we dispute that the description on original pages 2 and 3 supports his contention.

In any case, it is necessary to look at the disclosure as a whole and it is clear that the claim as now amended has ample support in the application as filed. Specifically, the reference now in claim 1 to the ink or coating supply is sufficient for compliance with the requirements for support. It is not justifiable to require the applicant to limit his claim by including arbitrary elements of a preferred embodiment.

With regard to claim 15, it should be noted that this is not an independent claim as it refers to the inking/coating apparatus of the preceding claims. It thus imports all the features of claim 1 and requires no further particularisation.

The Examiner will note that we have taken the opportunity to make a number of formal changes in the claims, including the addition of multiple dependencies. There are also a few minor clerical errors to be corrected in the description, which the Examiner may find more convenient to undertake himself, namely:

contd/ ...

Offices also at
Manchester N.

page 8, line 21 correct "areas"
page 12, line 2 delete "used"
 line 14 replace "86" with "58"

We believe the present amendments deal fully with the objections raised and thus place the application in order for allowance. As a formal matter, however we ask that if the intention should be formed to refuse the application we be given the opportunity for a hearing before any formal notice of rejection is issued.

Yours faithfully



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AUTORISED REPRESENTATIVE

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HAG/KA

Mr. ... for M/H
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line coating is performed, the last printing unit cannot be used to apply ink to the sheets, and can only be used for the coating operation. Thus, while coating with these types of in-line coating apparatus, the press loses the 5 capability of printing its full range of colors since the last printing unit is converted to a coating unit.

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- 10 It will be appreciated that the time required to reconfigure a press for coating or non-coating is non-productive and costly. Accordingly, there is a need for an in-line coating apparatus that minimizes the time to clean-up from one printing run and set-up and run the next job. Where consecutive jobs require the same type of coating, particularly blanket coating, it may not be necessary to clean-up the coater between jobs. However, the coating 15 material cannot be allowed to dry on the rollers. Therefore, especially when switching from blanket to spot coating or vice versa, or if there is a delay between jobs, it is necessary to wash-up the coater after each job is completed.
- 20 In addition, coater wash-up is necessary when switching between different coating compositions, such as aqueous and ultra violet (UV) curable coatings. Such coating materials are not interchangeable, and consequently, the coater must be washed between applications of 25 different coating media.

US 5,107,790 describes a two headed coater in which a spot coater assembly is disposed on one side of a plate cylinder and blanket cylinder pair and a blanket coating assembly is disposed on the other side of the cylinder pair. Each of the coating assemblies is slidably longitudinally away from the cylinder pair, in opposite directions, and the blanket coating assembly is also slidably displaceable along an inclined ramp, further away from the cylinder pair, these displacements being arranged to give access to each coating assembly. Such an arrangement requires a great deal of space and its usefulness is thus limited.

According to the present invention an inking/coating apparatus is provided for use in a printing press of the type having a printing unit on which a plate cylinder, a blanket cylinder and an impression cylinder are mounted for rotation, the apparatus comprising an applicator head for applying ink or coating materials to a plate mounted on the plate cylinder or to a blanket mounted on the blanket cylinder when the inking/coating apparatus is in the operative position relative to the plate and blanket cylinders, an applicator roller mounted in an applicator head being coupled with an ink or coating supply apparatus which provides a film of ink or coating on the applicator roll that can be transferred to said plate or blanket by movement of the applicator head being operative position, the applicator head to be pivotally mounted on a carriage assembly for movement to the operative position in

which the applicator head is disposed laterally adjacent to the plate and blanket cylinders, and for movement to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

PRINTING APPARATUS

5 The carriage assembly may comprise a support arm which is preferably mounted on the printing press to be pivotally coupled between the inking/coating head and a printing unit tower of the press. The inking/coating unit can then be arranged to make a pivotal, Ferris wheel movement between the operative position and a retracted, overhead idle position. This cantilevered pivotal mounting arrangement can facilitate the use of the inking/coating head between two printing units as well as on the last printing unit of the press.

10

15 In a preferred embodiment, the applicator head includes vertically spaced pairs of cradle members with one cradle pair being adapted for supporting a metal or ceramic coating roller in alignment with a blanket cylinder, and the other cradle pair supporting a resilient anilox coating roller in alignment with the plate cylinder, respectively, when the carriage assembly is in the operative position. Because of the cantilevered, pivotal support provided by the support arm, the applicator head can be lifted and lowered through an arc, similar to Ferris wheel movement, 20 in the limited space between adjacent printing units. When fully retracted, the applicator head and carriage assembly are lifted to an elevated, retracted overhead position, 25 preferably an overhead position overlying the printing unit

3b

tower, thus providing complete access to the interstation space and the printing unit cylinders without causing the printing unit to lose its printing capability. The

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inking/coating applicator roller of the applicator head can be inspected, cleaned or replaced and the doctor blade assembly can be washed-up automatically while the inking/coating apparatus is in the retracted position.

- 5 When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous ink or aqueous coating, it is preferred to arrange that the water component of the aqueous ink or coating on the freshly printed sheet is evaporated by a high velocity, hot air interstation dryer and a high volume heat and moisture extractor assembly so that the freshly printed ink or coating is completely dry before the sheet is printed on the next printing unit. This quick drying flexographic printing/coating arrangement permits a base coat of ink, for example opaque white or metallic ink (gold, silver or other metallics) to be applied in the first printing unit, and then overprinted by a lithographic process on the next printing unit.
- 10 15

Exemplary embodiments of the present invention are illustrated in the drawing figures wherein:

- 20 FIGURE 1 is a schematic side elevational view of a sheet-fed, rotary offset printing press having inking/coating apparatus embodying the present invention;

- 25 FIGURE 2 is a perspective view of the printing press of FIGURE 1 in which a dual head inking/coating apparatus is in the operative coating position and a single head coater is in a retracted, overhead position;

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CLAIMS

1. Inking/coating apparatus (10) for use in a printing press (12) of the type having a printing unit (22,24,26,28) on which a plate cylinder (32), a blanket cylinder (34) and
5 an impression cylinder (36) are mounted for rotation, wherein the inking/coating apparatus comprises:

10

an applicator head (60) for applying ink or coating materials to a plate (P) mounted on the plate cylinder or to a blanket (B) mounted on the blanket cylinder, when the inking/coating apparatus is in the operative position relative to the plate and blanket cylinders,

15

an applicator roller (66) mounted in applicator head (60) being coupled with an ink or coating supply apparatus (68) which provides a film of ink or coating on the applicator roller that can be transferred to said plate or blanket by movement of the applicator head to the operative position; and is characterised by

20

the applicator head (60) being pivotally mounted on a carriage assembly (58) for movement to the operative position in which the applicator head is disposed laterally adjacent to the plate and blanket cylinders and for movement to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

25

2. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) comprises:

a support arm (88,90) having a first end portion (88A) constructed for pivotal attachment to the printing unit and having a second end portion (88B) pivotally coupled to the applicator head (60), the applicator head being movable on the support arm to the operative position.

10

3. Inking/coating apparatus (10) as set forth in claim 1 or claim 2, wherein a counterweight (100,102) is coupled to the carriage assembly.

4. Inking/coating apparatus (10) as set forth in any one of claims 1 to 3, wherein the applicator head (60) comprises:

a doctor blade assembly (68) having a reservoir (70) for receiving ink or liquid coating material; and,

the applicator roller (66) being coupled to the doctor blade assembly in fluid communication with the reservoir.

15

5. Inking/coating apparatus (10) as set forth in claim 4, wherein the applicator roller (66) is an anilox roller having a resilient transfer surface.

6. Inking/coating apparatus (10) as set forth in any one of claims 1 to 5, wherein:

5 a power actuator (104, 106) is movably coupled to the applicator head (60), the power actuator having a power transfer arm (104A, 106A) which is extendable and retractable; and,

10 movement converting apparatus (108) is coupled to the power transfer arm for converting extension or retraction movement of the power transfer arm into pivotal movement of the applicator head (60) relative to the carriage assembly.

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7. Inking/coating apparatus (10) as set forth in claim 6, wherein the movement converting apparatus (108) comprises:

15 a bell crank plate (111) having a first end portion coupled to the power transfer arm and having a second end portion for engaging a stop member;

a stop member (119) secured to the applicator head (60); and,

20 a clevis plate (115) secured to the carriage assembly (58) and pivotally coupled to the bell crank plate.

25 8. Inking/coating apparatus (10) as set forth in any one of claims 1 to 3, wherein the applicator head (60) comprises:

first and second side frame members (74, 76) pivotally coupled to the carriage assembly (58);

5 a doctor blade assembly mounted on the first and second side frame members, the doctor blade assembly including a reservoir (70) for receiving ink or liquid coating material;

a cradle assembly (78, 80), (82, 84) mounted on the first and second side frame members, respectively; the applicator roller (66) being mounted for

10 rotation on the cradle assembly and coupled to the doctor blade assembly for rolling contact with ink or coating material in the reservoir; and

15

a drive motor (62) coupled to the applicator roller for rotating the applicator roller.

9. Inking/coating apparatus (10) as set forth
20 in claim 8, wherein:

the cradle assembly (79, 80) has first and second sockets (79, 81) disposed on the first and second side frame members respectively; and,

25 the applicator roller (66) is mounted for rotation on the first and second sockets.

10. Inking/coating apparatus (10) as set forth
in claim 8, wherein:

the cradle assembly (78, 80), (82, 84)
includes first and second sockets (79, 81) disposed on the
5 first and second side frame members, respectively, and
third and fourth sockets disposed on the first and second
side frame members, respectively; and,

10 the applicator roller (66) is selectively
mountable for rotation on either the first and second
sockets or on the third and fourth sockets for applying ink
or coating material to either the plate or blanket when the
applicator head is in the operative position.

15 11. Inking/coating apparatus (10) as set forth
in any one of claims 1 to 7, wherein the applicator head (60) comprises:

15 a first cradle (78, 80) for supporting an
applicator roller (66) for engagement with the plate when
the inking/coating apparatus is in the operative position;
and

20 a second cradle (82, 84) for supporting an
applicator roller (66) for engagement with the blanket (B)
when the inking/coating apparatus is in the operative
position.

25 12. Inking/coating apparatus (10) as set forth
in claim 1, wherein the carriage assembly comprises:

a support arm (88, 90) having a first end portion pivotally coupled to the printing unit (88A, 90A) and having a second end portion (88B, 90B);

5 a common pivot shaft (77) on which the support arm second end portion and the inking/coating apparatus are pivotally mounted; and,

10 male and female latch members (103, 105) coupled between the common pivot shaft and the printing unit, with one of the latch members being secured to the common pivot shaft and the other latch member being constructed for attachment onto the printing unit, the latch members being mateable in interlocking engagement when the applicator head (60) is in the operative position.

15 13. Inking/coating apparatus (10) as set forth in any one of the preceding claims, wherein the applicator head (60) and the printing unit comprise :

20 male and female latch coupling members (103, 105) mounted on the carriage assembly (58) and on the printing unit for releasably latching the carriage assembly in interlocking engagement with the printing unit when the applicator head is in the operative position.

25 14. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) comprises an elongated shank portion (88B, 90B) and a hub portion (88A, 90A), the elongated shank portion being pivotally coupled to the applicator head (60) and the hub

portion being constructed for pivotal attachment onto the printing unit.

15. A rotary offset printing press (12) having first and second printing units (22, 24) and the ink-
5 ing/coating apparatus (10) of any one of the preceding claims movably coupled to the first printing unit (22) as set forth in claim 1, wherein:

10 a dryer (112) mounted on the first printing unit adjacent the impression cylinder (36) of the first printing unit for discharging heated air onto a freshly printed substrate while the freshly printed substrate is in contact with said impression cylinder.

16. A rotary offset printing press (12) as defined in claim 15, comprising:

15 an extractor (112E) is disposed adjacent the dryer for extracting hot air, moisture and volatiles from an exposure zone (Z) between the dryer and the freshly printed substrate.

17. A rotary offset printing press (12) as
20 defined in claim 15 or claim 16, comprising

an intermediate transfer cylinder (40) is coupled in sheet transfer relation with the impression cylinder (36) of the first printing unit (22); and,

25 an interstation dryer (114) is disposed adjacent the intermediate transfer cylinder for discharging

heated air onto a freshly printed or coated substrate after it has been transferred from the impression cylinder of the first printing unit and while it is in contact with the intermediate transfer cylinder (40).

- 5 18. A method for rotary offset printing in a
printing press (12) of the type including first and second
rotary offset printing units (22, 24), and using aqueous or
UV-curable printing ink or coating material in the opera-
tion of at least the first printing unit, characterized by
0 the following steps performed at each printing unit in
succession:

spot or overall coating a plate (P) with aqueous ink/aqueous coating material or UV-curable ink/UV-curable coating material:

spot and/or overall coating a blanket (B) with aqueous ink/aqueous coating material or UV-curable ink or UV-curable coating material;

transferring the printing ink or coating material from the printing plate (P) to the blanket (B);

20 transferring the inked or coated image from
the blanket to a substrate (S) as the substrate is trans-
ferred through the nip between the impression cylinder (36)
and the blanket (B); and,

25 drying the ink or coating material on the
freshly printed substrate before the substrate is subsequently processed.

19. A method for rotary offset printing as defined in claim 18, wherein the drying step comprises:

discharging high velocity, heated air onto
5 the freshly printed/coated substrate (S) while the freshly printed/coated substrate is in contact with the impression cylinder (36) of the first printing unit (22).

20. A method for rotary offset printing as defined in claim 18 further comprising:

10 transferring the freshly printed substrate (S) from the first printing unit (22) to an intermediate transfer cylinder (40); and,

drying the freshly printed substrate while it is in contact with the intermediate transfer cylinder.

15 21. A method for rotary offset printing as defined in claim 18 or claim 19, further comprising:

extracting hot air, moisture and volatiles from an exposure zone (Z) above the freshly printed/coated substrate (S) while the freshly printed/coated substrate is
20 in contact with the impression cylinder (36).

22. A method for rotary offset printing as defined in any one of claims 18 to 21, further comprising:

applying a primer coating of an aqueous coating material or UV-curable coating material to a
25 substrate (S) in the first printing unit (22); and,

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drying the primer coating on the substrate
before the substrate is processed in the second printing
unit.



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EXAM 4

5

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